Central Valley Regional Water Quality Control Board
Conditional Waiver for Irrigated Agriculture Monitoring Program
Phase II
Sampling Results July 2004 – September 2004

Quarterly Report – Activities from July 1, 2004 – September 30, 2004

Prepared for the Central Valley Regional Water Quality Control Board

By

Aquatic Ecosystems Analysis Laboratory
John Muir Institute of the Environment
University of California, Davis

January 29, 2005

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Irrigation monitoring occurred from 8 July 2004 through 16 September 2004. A total of 31 sites were sampled with most sites being sampled once every two weeks up to a maximum of five times each. Due to very low flows, not all sites were able to be sampled every sample period leaving 132 samples collected and analyzed. Samples were analyzed for toxicity, pesticides, metals, nutrients, physical parameters, and drinking water constituents. Parameters selected for analysis depended on the location and the anticipated constituents that could be in the water, consequently, not all samples were analyzed for all parameters. In addition, 33 sediment samples were collected and analyzed for toxicity and sediment chemistry by UC Berkeley.

One hundred and thirty surface water samples were collected for each of the five pesticide groups: organochlorine (OCH) pesticides, organophosphate (OP) pesticides, pyrethroids, carbamates and herbicides. The most commonly detected pesticide was chlorpyrifos (37%), followed by diuron (18%), diazinon (17%), and dimethoate (16%). The frequencies of detection for the other pesticides ranged between 0 - 7%. The maximum concentration for detected compounds was 9.72 µg/L of aldicarb at Spring Creek at Walnut Drive.

Organophosphate pesticides were detected in the greatest frequency of the five classes of pesticides with chlorpyrifos (37%), diazinon (17%) and dimethoate (16%) being the most common. Organophosphates were detected at 19 of the 31 sites and throughout every part of the Central Valley. Pyrethroids were detected at Orestimba Creek at Kilburn Road and the Stevenson Lower Lateral at the intersection of Faith Home Road and Turner Road, both in the northern San Joaquin Valley, with a single detect at each site. In each case the pyrethroid detected was bifenthrin.

Carbamates were found at 8 of the 31 sites. The most detected carbamate was methomyl with a frequency of 5%. The highest concentration detected of any carbamate was 9.72 µg/L of aldicarb at Spring Creek at Walnut Drive.
Thirteen of the 31 sites showed herbicide detections. Diuron was measured with a frequency of 18%. During the whole sampling period, diuron was found at almost every sampling event at the three Delta locations (Drain to San Joaquin River off south Manthey Road, Drain to Grant Line Canal off Wing Levee Road, and Drain to North Canal at South Bonetti Road) and the Poso drain. Diuron also showed the highest concentration of any herbicide detected with 0.95 µg/L at the Drain to San Joaquin River off south Manthey Road.

Of the seventy water samples collected and analyzed for THM's, only one sample was found to contain a detectable amount and sampling for this class of constituent was terminated.

One hundred twenty three water column samples were collected and tested for acute toxicity. One half of the 96-hr tests with the algae *Selenastrum capricornutum* resulted in significantly different growth of the sample compared to the control group. Acute tests

run with *Ceriodaphnia dubia* resulted in 100% mortality in 5 out of 123 water samples (4%). Hamilton Slough at Highway 99 and Willow Slough at Road 99 experienced significantly reduced survival of fathead minnows compared to controls. At only one site, Willow Slough at Road 99, was toxicity observed with no detectable pesticides in the water samples. All other instances of toxicity were associated with detections of pesticides, and at all but one site multiple pesticide detections occurred. Carbaryl, dimethoate, chlorpyrifos, and diazinon were commonly associated with positive toxicity tests, but DDE, thiobencarb, and disulfoton were also associated with positive toxicity tests.

Sediment chemistry analysis resulted in detections of chlorpyrifos, DDT, DDE, dieldrin, endrin, permethrin, lambda-cyhalothrin, esfenvalerate, and bifenthrin. Sediment from five sites exhibited significant sublethal or lethal toxicity to *Hyalella azteca*. Four of the sites with acute toxicity also had levels of pyrethroids in the sediment that would be expected to result in toxicity. One site with sufficient levels of pyrethroids to cause toxicity did not, and the remaining 29 samples with no toxicity had low levels of pyrethroids that would not be expected to cause toxicity. The pyrethroids that were the probable causes of toxicity were esfenvalerate, lambda-cyhalothrin, and bifenthrin. The cause for sublethal toxicity (reduced growth of the test organism) at one site could not be determined as all pesticides were not detectable except for trace amounts of DDT.

BACKGROUND

The California Water Code (CWC) requires that discharges or proposed discharges to surface waters that could affect water quality must be described in a Report of Waste Discharge (ROWD). In the past, the Central Valley Regional Water Quality Control Board (CRWQCB) has regulated these waste discharges primarily through the issuance of Waste Discharge Requirements (WDRs) and National Pollutant Discharge Elimination System (NPDES) permits. NPDES permits are issued for point source and municipal storm water discharges, but irrigation return flows and storm water discharges from irrigated lands have been excluded from the program as a result of Resolution No. 82-036 "*Waiving Waste Discharge Requirements for Specific Types of Discharge*" which was adopted by the CRWQCB in 1982. This resolution exempted irrigation return flows and storm water runoff from agricultural lands from permitting requirements. Due to insufficient resources, verification that dischargers were complying with the conditions of the waiver was not conducted and thus the 1982 waiver was largely a passive program.

In 1999, Senate Bill 390 changed the section of the California Water Code that authorized waivers of Waste Discharge Requirements specifying that all discharge waivers in place on January 1 2000 would end January 1 2003 if the Regional Board did not readopt them.

In November 2000, a lawsuit was filed against the CRWQCB by the San Francisco BayKeeper, the DeltaKeeper and the California Public Interest Group to constrain the agricultural dischargers to obtain clean water permits and for the Regional Boards to use Waste Discharge Requirements to control discharges of pesticides from irrigated lands.

In July 2003, the Regional Board adopted Resolution R5-2003-0105. This resolution includes two Conditional Waivers, one for Coalition Groups that form on behalf of individual dischargers and the other for individual dischargers, to facilitate compliance with the California Water Code and the Plans and Policies of the Regional Boards. The Resolution R5-2003-0105 stipulates that the Coalition Groups must develop waste monitoring programs to assess the sources and impacts of waste in the discharges from irrigated lands and, if necessary, track progress in reducing the amount of waste discharge that affects the quality of the waters of the state and it's beneficial uses. By January 2005 the local groups have to start their own monitoring programs. The goal of the two-year interim Waivers is to build capacity of local coalitions, engage with individual dischargers and initiate data collection, all aspects of the foundation for the long-term program (CRWQCB 2003).

INTRODUCTION

In conjunction with the resolution, the Regional Board executed an interagency agreement with UC Davis Aquatic Toxicology Laboratory in November 2002 to conduct an evaluation of water quality of agricultural drains throughout the Central Valley, which is considered Phase I of the program. The water was evaluated primarily through the use of aquatic species toxicity testing in a limited number of agricultural drains in the San

Joaquin River and Sacramento River watersheds. Phase II of the program was contracted to UC Davis Aquatic Ecosystem Analysis Laboratory and the California Department of Fish and Game (CDFG).

Phase II of the program includes the following objectives:

- Evaluation of water quality by using chemical analysis and toxicity testing in a number of agricultural drains in the Central Valley
- Identification of the causes (e.g. sediment, contaminants, salt, pesticides etc.) of any water quality impairment
- Determination of the sources of contaminants based on the identified causes of impairments
- Use of the data and information gained in this program for recommending use of management practices and future assessment of agricultural runoff and drainage waters.

For Phase II selected sites are sampled for chemical analysis, water and sediment toxicity during the storm season (December through February) and the irrigation season (March through September). The sampling is anticipated to occur during the first 24 months of the Phase II program, the third year will be used for data management and reporting. Phase III of the program, which shall not begin later than two years from the start of Phase II incorporate management practice effectiveness and implementation tracking and additional water quality monitoring sites in the upper portions of the watershed.

The primary criteria for site selection are: (1) Drainage dominated by agricultural irrigation return flow (2) Land use patterns surrounding the site predominated by agricultural activities, and (3) Site is at a location near where the drainage water is discharged into a creek or river.

DESCRIPTION OF THE STUDY AREA

The Central Valley is approximately 450 mi (720 km) long and 50 mi (80 km) wide, lying between the Sierra Nevada and the Coast Ranges in central California. The Sacramento and San Joaquin rivers drain most of the valley before converging in a delta and flowing into San Francisco Bay; the delta is one of California's leading truck-farming and horticultural areas.

The Central Valley is California's agricultural heartland. With its long growing season and fertile soil, the valley has the largest single concentration of fruit and nut farms and vineyards in the United States; cotton, grain and vegetables are also grown. Precipitation ranges from 30 in. (76 cm) in the north to 6 in. (15.2 cm) in the south. Two thirds of the valley's agricultural land is in the south, while two thirds of its water is in the north. The Central Valley project addresses this problem by bringing water from the Sacramento basin in the north into the San Joaquin Valley in the south.

Sampling sites for the Irrigation Monitoring Phase II Agricultural Waiver Program were chosen from as far North as Redding reaching down South to the Tulare Basin (Table 1).

Table 1. Irrigation season monitoring sites for 2004. Site ID is used throughout the report to refer to the specific sites

Site ID	Site Name	County	Latitude	Longitude
NS04	Antelope Creek at Kansas Avenue	Tehama	40.12483	-121.11470
NS07	China Slough between Vina and Hwy 99	Tehama	39.93724	-122.04963
NS08	Keefer Slough at Hwy 99	Butte	39.80799	-121.91081
CS03	Stony Creek on Hwy 45 near Rd 24	Glenn	39.70982	-122.00221
CS09	Simmerly Slough at Ellis Avenue	Yuba	39.19808	-121.57696
CS10	Yankee Slough at Swanson Road	Sutter	38.96777	-121.51453
CS12	Unnamed Drain of Walker Creek on County Road. 28	Glenn	39.66846	-122.22385
CS13	Unnamed Canal at Hwy 45	Colusa	38.96886	-121.86087
CS15	Spring Creek at Walnut Creek	Colusa	39.11975	-122.19318
CS21	Hamilton Slough at Hwy 99	Butte	39.42279	-121.68722
SS03	Willow Slough at Road 99	Yolo	38.60471	-121.78422
SS04	Unnamed Ditch at SW corner of Levee Road and Riego Road	Sutter	38.75116	-121.49370
SS07	West Adams Canal at Road 89	Yolo	38.70488	-121.96093
D01	Drain to San Joaquin River off South Manthey Road	San Joaquin	37.82340	-121.29850
D02	Drain to Grant Line off Wing Levee Road	San Joaquin	37.82050	-121.40350
D03	Drain to North Canal at South Bonetti Road	San Joaquin	37.87150	-121.52560
NSJ03	Unnamed Canal at west end of Woodbridge Road	San Joaquin	38.15266	-121.49860
NSJ06	Mormon Slough on Jack Tone Road	San Joaquin	37.96505	-121.14793
NSJ18	Orestimba Creek at Kilburn Road	Stanislaus	37.39918	-121.03168
NSJ24	Dry Creek at J9	Stanislaus	37.65894	-120.77867
NSJ26	Ingalsbe Slough at J17	Merced	37.49167	-120.55640
NSJ28	Drain to Pixley Slough at Eighmile Road	San Joaquin	38.05765	-121.33048
NSJ29	Stevison Lower Lateral at intersection of Faith Home Road and Turner Road	Merced	37.37240	-120.92194
SSJ01	Cottonwood Creek at Hwy 145 in Madera County	Madera	36.90021	-120.05489
SSJ08	Poso Drain at Intersection of Turner Island Road and Palazzo Road	Merced	37.12854	-120.70565
SSJ12	Duck Slough at Arboleda Drive	Merced	37.25734	-120.37818
FT05	Button Ditch on Ave 368 west of Alta Ave	Tulare	36.45856	-119.39828
FT08	West Reedley Ditch at East Adams Avenue	Fresno	36.63328	-119.44552
FT13	Kings River at Jackson Ave Bridge	Kings	36.25584	-119.85412
FT14	Tule River at Popular Ave	Tulare	36.05001	-119.50499
FT15	Calloway Canal at Hwy 46	Kern	35.60171	-119.26294

Irrigation monitoring occurred from 8 July 2004 through 16 September 2004 (Table 2). A total of 31 sites were sampled with most sites being sampled once every two weeks for a maximum of five times each. Some sites, mainly those in the Fresno-Tulare area (SSJ01, FT05, FT08, FT13, FT14, FT15), weren't sampled throughout the whole period of time due to the end of seasonal irrigation practices. Three sites in the northern Sacramento basin (NS04, NS07 and NS08) were not sampled during July, and one site, Keefer Slough at Hwy 99 (NS08), was dry on each visit and was never sampled. Two other sites were dry once each: Unnamed ditch at SW corner of Levee Road and Riego Road (SS04) on September 7 and Tule River at Poplar Ave (FT14) on August 2. A reduced sampling effort that consisted only of pesticide screening was performed on 7 occasions at five sites due to puddle-like, low flow and standing water conditions. The sites and dates of pesticide screening were: Stony Creek on Hwy 45 near Rd 24 (CS03)

Table 2. Sampling Frequencies of Agricultural Waiver Phase II Irrigation Monitoring Sites

Sampling Rounds	1	2	3	4	5
Start date of Sampling Round	7/8/2004	7/22/2004	8/5/2004	8/19/2004	9/2/2004
NS04					
NS07					
NS08			8/12/2004	8/30/2004	9/16/2004
CS03		7/26/2004		8/23/2004	
CS09					
CS10					
CS12					
CS13					
CS15				8/23/2004	9/8/2004
CS 21					
SS03					
SS04					9/7/2004
SS07					
D01					9/14/2004
D02					
D03					
NSJ03					
NSJ06					
NSJ18					
NSJ24					
NSJ26					
NSJ28					
NSJ29					
SSJ01					
SSJ08					
SSJ12					
FT05			8/16/2004		
FT08			8/17/2004		
FT13					
FT14		8/2/2004			
FT15					

pesticide screening
dry
no sampling

on July 26 and August 23, Spring Creek at Walnut Drive (CS15) on August 23 and September 8, Drain to San Joaquin River off south Manthey Road (D01) on September 4, Button Ditch on Ave 368 west of Alta Ave (FT05) on August 16 and West Reedley Ditch at East Adams Avenue (FT08) on August 17.

Sediment samples were collected once during the irrigation season 2004. Sediment samples were collected by UCD and UCB. Over all, 33 locations were sampled for sediment toxicity (Table 3). Most of the sediment samples were collected at the same locations than the water samples. Some of those locations didn't allow the collection due to the absence of soft sediment, no water or the depth of the water. Three sites (D03, NSJ03 and NSJ28) could not be sampled at the same location as the water samples were collected, but sediment sampling was possible by either moving 1-3km up or down the same water body. Due to that, locations received a new ID such as D03 became SED11, NSJ03 became SED10 and NSJ28 became SED9. Additional sites were selected by UCB from the original Ag Waiver site table from the "secondary site" and the "future site" list, such as CS09, SSJ04, SSJ05 and SSJ09. During field inspection SED3, SED6, SED7, SED8, SED12 were also chosen by UCB for sediment toxicity sampling.

Table 3. Sediment Sites

Site ID	Site Name	County	Latitude	Longitude
CS02	Unnamed Canal at Cutting Road between County Road P and 6th Avenue	Tehama/Glenn	39.79770	-122.13170
CS03	Stony Creek on Hwy 45 near Rd 24	Glenn	39.70982	-122.00221
CS09	Simmerly Slough at Ellis Avenue	Yuba	39.19808	-121.57696
CS10	Yankee Slough at Swanson Road	Sutter	38.96777	-121.51453
CS12	Unnamed Drain of Walker Creek on County Road. 28	Glenn	39.66846	-122.22385
CS13	Unnamed Canal at Hwy 45	Colusa	38.96886	-121.86087
CS15	Spring Creek at Walnut Creek	Colusa	39.11975	-122.19318
CS21	Hamilton Slough at Hwy 99	Butte	39.42279	-121.68722
D02	Drain to Grant Line Canal off Wing Levee Road	San Joaquin	37.82050	-121.40350
FT05	Button Ditch on Ave 368 west of Alta Ave	Tulare	36.45856	-119.39828
FT08	West Reedley Ditch at East Adams Avenue	Fresno	36.63328	-119.44552
FT14	Tule River at Popular Ave	Tulare	36.05001	-119.50499
FT15	Calloway Canal at Hwy 46	Kern	35.60171	-119.26294
NS07	China Slough between Vina and Hwy 99	Tehama	39.93724	-122.04963
NSJ18	Orestimba Creek at Kilburn Road	Stanislaus	37.39918	-121.03168
NSJ24	Dry Creek at J9	Stanislaus	37.65894	-120.77867
NSJ26	Ingalsbe Slough at J17	Merced	37.49167	-120.55640
SED3	Butte Creek at Durnel Road	Butte	39.58390	-121.80000
SED6	Juncture of Poso Drain and Pick Anderson Bypass	Merced	37.14060	-120.70720
SED7	Tom Paine Slough at Paradise Road	San Joaquin	37.77160	-121.38600
SED8	Unnamed Slough at Wildwood Road	San Joaquin	37.86330	-121.12820
SED9	Drain to Pixley Slouth at Davis Road	San Joaquin	38.05640	-121.33320
SED10	Unnamed Canal on Woodbridge Road	San Joaquin	NA	NA
SED11	Drain to North Canal at South Bonetti Road	San Joaquin	37.86430	-121.52000
SED12	Hospital Creek at Road 33	San Joaquin	37.61230	-121.25970
SS03	Willow Slough at Road 99	Yolo	38.60471	-121.78422
SS04	Unnamed Ditch at SW corner of Levee Road and Riego Road	Sutter	38.75116	-121.49370
SS07	West Adams Canal at Road 89	Yolo	38.70488	-121.96093
SSJ01	Cottonwood Creek at Hwy 145 in Madera County	Madera	36.90021	-120.05489
SSJ04	Island Field Drain on Catrina Road	Merced	37.06160	-120.57340
SSJ05	Main Canal at Badger Flat Road	Merced	37.07120	-120.87680
SSJ08	Poso Drain at Intersection of Turner Island Road and Palazzo Road	Merced	37.12854	-120.70565
SSJ09	Sand Slough on Turner Island Road West of Merced Nat'l Wildlife Refuge	Merced	37.17170	-120.68340

METHODS

FIELD METHODS

Discrete water samples were collected for analysis of concentrations of various pesticides, metals and nutrients, of toxicity and of physical parameters (Table 4). In addition to the surface water samples, sediment samples were collected.

Table 4. Summary of Sample Container, Volume, Initial Preservation and Holding Time Recommendations for Water and Sediment Samples

Parameters for Analysis in WATER Samples	Recommended Containers (all containers pre-cleaned)	Typical Sample Volume (ml)	Initial Field Preservation	Maximum Holding Time (analysis must start by end of max)
Physical Parameters[1]				
Color	1 liter glass or polyethylene	500 ml	Cool to 4°C, dark	48 hours at 4°C, dark
Turbidity	"	150 ml	"	48 hours at 4°C, dark
Total Dissolved Solids (TDS)	"	1000 ml	"	7 days at 4°C, dark
Nutrients[1]				
Ortho-phosphate (O-PO_4)	Trace clean and certified polyethylene	100 ml	Cool to 4°C, dark	48 hours at 4°C, dark
Nitrate + Nitrite (NO_3 + NO_2)	"	150 ml	"	Recommend 48 hours at 4°C, dark or If preserved, H_2SO_4 pH<2 28 days, either one at 4°C, dark
Nitrite (NO_2)	"	150 ml	"	48 hours at 4°C, dark
Total Keldjahl Nitrogen (TKN)	"	600 ml	"	Recommend 48 hours at 4°C, dark or If preserved, H_2SO_4 pH<2 Recommend: 7 days Maximum: 28 days Either one at 4°C, dark
Ammonia (NH_3)	"	500 ml	"	Recommend 48 hours at 4°C, dark or If preserved, H_2SO_4 pH<2 Recommend: 7 days Maximum: 28 days Either one at 4°C, dark

(1) NOTE:
The volume of water necessary to collect in order to analyze for the above constituents is typically combined in multiple 1-liter polyethylene bottles, which also allows enough volume for possible re-analysis and for conducting lab spike duplicates. This is possible since the same laboratory is conducting all of the above analyses; otherwise, individual volumes apply.

Table 4. Summary of Sample Container, Volume, Initial Preservation, and Holding Time Recommendations for Water Samples (Continued)

Parameters for Analysis in WATER Samples	Recommended Containers (all containers pre-cleaned)	Typical Sample Volume (ml)	Initial Field Preservation	Maximum Holding Time (analysis must start by end of max)
TOC and THMs in Drinking Water and Surface Water				
Total Organic Carbon (TOC)	40 ml glass vial	40 ml (one vial)	Cool to 4°C, dark	28 days at 4°C, dark
Trihalomethanes (chloroform, bromoform, dibromochloromethane, bromodichloromethane)	40 ml VOA vials	120 ml (three VOA vials)	Cool to 4°C, dark	14 days at 4°C, dark
Trace Elements in Water Samples				
TOTAL ELEMENTS (As, B, Cd, Cu, K, Ni, P, Pb, Se, Zn)	60 ml polyethylene bottle, pre-cleaned in lab using HNO_3	60 ml (one bottle)	Cool to 4°C, dark. Acidify in lab within 48 hrs, with ultra-pure HNO_3 for pH<2.	Once sample is acidified, can store up to 6 months at room temperature
HARDNESS	200 ml polyethylene or glass bottle	200 ml (one bottle)	Cool to 4°C, dark	48 hours at 4°C, dark
Synthetic Organic Compounds in Water Samples				
PESTICIDES & HERBICIDES* □Organophosphate Pesticides □Organochlorine Pesticides □Carbamates □Pyrethroids □Herbicides	1-L I-Chem 200-series certified trace clean amber glass bottle, with Teflon lid-liner (per each sample type)	1000 ml (one container) *Each sample type requires 1000 ml in a separate container	Cool to 4°C, dark If chlorine is present, add 0.1g sodium thiosulfate	Keep at 4°C, dark, up to 7 days. Extraction must be performed within the 7 days; analysis must be performed within 40 days of extraction.
Toxicity Testing - Water Samples				
TOXICITY IN WATER	Four 2.25 L I-Chem 200-series certified amber glass bottles	9000 ml	Cool to 4°C, dark	36 hours at 4°C, dark
Sediment Toxicity - Sediment Samples				
TOXICITY IN SEDIMENT	Four L I-Chem 200-series certified clear glass jugs	3000 ml	Cool to 4°C, dark	One week at 4°C, dark

The samples were collected following the Standard Operating Procedures included in the Quality Assurance Project Plan developed for the Agricultural Waiver Monitoring Program. The samples were put on ice immediately after collection. The Water Column Toxicity samples were delivered to the Department of Fish & Game Aquatic Toxicology Laboratory, the TOC samples were delivered to the UC Davis Department of Civil and Environmental Engineering, Metal samples were shipped to the Department of Fish & Game Marine Pollution Studies Laboratory in Moss Landing and all other samples were analyzed at the Department of Fish and Game Fish and Wildlife Water Pollution Control Laboratory in Rancho Cordova.

Temperature, pH, conductivity (EC) and dissolved oxygen (DO) were measured using Oakton* pH/Con 10 Multiparameter Meter and Fisherbrand* Traceable* Dissolved Oxygen Meter. Field measurements, weather and water conditions were noted on field sheets as well as the sampling time, the number of collected samples and quality control samples.

Velocity was measured either by using a bridgeboard or by wading if the stream flow exceeded the rating limit of the meter. Four different current meters were used to determine the stream velocities: USGS Price Type AA Current Meter for low and normal velocities, Swoffer Current Velocity Meter Model 2100 or Marsh-McBirney Velocity Meter FLO-MATE Model 2000.

Table 5. Summary of the discharge in ft^3/s measured during the Irrigation Season 2004

Sampling Period	**1**	**2**	**3**	**4**	**5**
Site ID	**Jul 08-21**	**Jul 22-Aug 4**	**Aug 5-18**	**Aug 19-Sept 1**	**Sept 2-16**
NS04	NA	NA	0.86	NA	2.52
NS07	NA	NA	6.95	29.28	15.16
NS08	NA	NA	NA	NA	NA
CS03	0.45	NA	5.76	NA	2.99
CS09	NA	NA	NA	NA	NA
CS10	NA	NA	NA	15.7	6.8
CS12	NA	NA	2.08	NA	2.34
CS13	20.64	NA	9.26	17.4	23.08
CS15	NA	NA	0.4	NA	NA
CS21	7.76	10.56	5.74	6.8	0.21
SS03	28.89	45.7	50.47	29.26	64.45
SS04	NA	5.37	7.4	0.4	NA
SS07	126.21	126.6	110.27	51.84	44.91
D01	NA	NA	NA	NA	NA
D02	NA	NA	NA	NA	NA
D03	NA	NA	NA	NA	NA
NSJ03	NA	NA	NA	NA	NA
NJS06	NA	NA	NA	NA	NA

NSJ18	11.05	11.5	7.96	1.59	4.55
NSJ24	20.35	131.19	23.76	20.69	16.55
NSJ26	24.38	52.47	17.17	18.4	14.65
NSJ28	6.83	6.69	12.85	1.36	15.97
NJS29	3.22	10.53	5.0	4.14	17.57
SSJ01	E	E	37.57	NA	NA
SSJ08	86.65	51.86	69.25	19.92	11.98
SSJ12	67.2	79.93	63.76	10.13	22.59
FT05	E	5.88	NA	NA	NA
FT08	E	30.94	NA	NA	NA
FT13	365±20[1]	390±20[1]	0[1]	NA	NA
FT14	E	NA	17.01	NA	NA
FT15	E	E	NA	NA	NA

[1] Discharge received from Kings River Water Association
NA: Discharge values are not applicable due to one or more reasons: 1) site was not sampled during that round, 2) site was dry, 3) flow was below Rating Limit of the meter 4) conditions were unsafe to sample.
E: Discharge was estimated using cross-sectional widths and float method; not included due to amount of error associated with estimations.

Discharge was measured following the standard method described in USDA Technical Report RM-245. For velocity that was measured in a channel, the currently recommended mid-section method by the U.S. Geological Survey was used to compute discharge (Harrelson 1994).

In several of the sample sites, the depth and flow of the channel prohibited velocity estimation by the standard wading method. In some of these cases a bridge was accessible for estimation of velocity by the standard bridge method. However, some sites had culverts rather than bridges. Frequently culvert discharges were at high enough velocities to render the bridge method ineffective due to the inability to keep the line vertical on the velocity meter. Also, during periods of high discharge, wading velocity measurements from these culverts can be quite dangerous.

It was determined that velocity did not vary across the width of the culvert at the downstream end at a given depth. Velocity did vary across depth at the downstream end. Given these factors it was determined that it would be possible to accurately estimate discharge by taking velocity measurements at several depths and applying those velocities to horizontal sections of the water column at those depths. Rather than taking many velocity measurements across the width of the culvert, it was possible to use just one measurement at each depth. In this way field technicians could reduce risk since they were not required to reach across the width of the culvert, and they could take just three measurements instead of 20 or more.

Culvert flows were calculated by estimating the cross-section area of the water at the point where it leaves the culvert, then multiplying this area by the velocity of the water. The water was divided into three sections by depth, with velocities taken at one point in each depth range. The depth ranges were bottom of water column to 70% depth of water

(DoW); 70% DoW to 40% DoW; and 40% DoW to water surface. The velocity was recorded at 80% DoW, 60% DoW, and 20% DoW. The depths for velocity measurements were chosen based on USGS protocol for velocity estimation in a channel.

Sediment methodology is included in Appendix II.

ANALYTICAL METHODS

Organic Analytical Methods

Volatile Organic Compounds (EPA 8260)
The volatile compounds were introduced into the gas chromatograph (GC) by the purge-and-trap method. Samples were transferred to a purge and trap sparger and purged with inert gas. The target analytes were trapped during the purge cycle on a Tenax trap. After the purge cycle was completed, the Tenax trap was heated and the analytes were introduced directly into a capillary column for analysis. The (GC) column was temperature-programmed to separate the analytes, which were then detected with a mass spectrometer (MS) interfaced to the gas chromatograph (GC). Analytes eluted from the capillary column were introduced into the MS via direct connection. Identification of target analytes was accomplished by comparing their retention time and mass spectra with the retention time and electron impact spectra of authentic standards. Quantitation was accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using a five-point calibration curve.

Pesticide/herbicide Analytical Methods

Sample Extraction for Organochlorines, Organophosphorus, Triazines, Selective Herbicides, and Pyrethroids – EPA 3510C
A measured volume of sample (1.0 L) was extracted with methylene chloride (DCM) using a separatory funnel (liq/liq technique). The DCM extract was dried with sodium sulfate, evaporated using a Kuderna-Danish (K-D) apparatus and solvent exchanged into petroleum ether. The extract was concentrated using a micro-snyder (micro K-D) apparatus to approximately 1.0 ml and finally adjusted to 2.0 ml with iso-octane.

Sample Preparation for Selective Herbicides – EPA 3535
A measured volume of sample (1.0 L) was acidified with sulfuric acid: DI water (1:1) to pH $\leq$ 2, the acidified sample was then eluted through a pre-conditioned C18 (Sep-Pak) column. The target herbicides were eluted from the C18 column with 2.0 ml methanol.

Sample Preparation for Carbamates – EPA 3510CM
A measured volume of sample (1.0 L) was extracted with methylene chloride (DCM) using a separatory funnel. The DCM extract was dried with sodium sulfate, evaporated to almost dryness using rotary evaporator and finally adjusted to 2.0 ml with methanol.

Instrumentation Methods

Organochlorines Pesticides – EPA 8081A
Organochlorines were analyzed using an Agilent 6890 plus, equipped with two micro ECD detectors, EPC split-splitless injector, Agilent auto-sampler and dual 60 meter capillary columns (DB5 and DB17)(0.25 mm ID and 0.25 µm film thickness) connected to a single injection port using a "Y" fit connector.

Organophosphorus Pesticides – EPA 8141A
The samples were analyzed using an Agilent 6890 plus, equipped with two FPD detectors in phosphorous mode, EPC split-splitless injector, Agilent auto-sampler and dual 60 meter capillary columns (DB5 and DB17) (0.25 mm ID and 0.25 µm film thickness) connected to a single injection port using a "Y" fit connector.

Triazines – EPA 619
Triazine herbicides were analyzed using a GC Varian 3600, equipped with two TSD detectors, 7890 injector, 8200 autosampler and dual 30 meter capillary columns (DB5 and DB17) (0.25 mm ID and 0.25 µm film thickness) connected to a single injection port using a "Y" fit connector.

Selective Herbicides – EPA 1656M
Some herbicides were analyzed using an Agilent 1100 high performance liquid chromatograph/mass spectrometer (HPLC-MS) using atmospheric pressure electrospray ionization in negative and/or positive mode.

Glyphosate/AMPA – EPA 547
The samples were analyzed by direct injection using a Hewlett Packard 1100 HPLC equipped with post column derivatization, and fluorescence detector.

Pyrethroids – EPA 1660M
Pyrethroids were analyzed using an Agilent 6890 plus, equipped with two micro ECD detectors, EPC split-splitless injector, Agilent auto-sampler and dual 60 meter capillary columns (DB5 and DB17)(0.25 mm ID and 0.25 µm film thickness) connected to a single injection port using a "Y" fit connector.

Carbamates – EPA 632M
Carbamates were analyzed by Agilent 1100 liquid chromatograph/mass spectrometer (HPLC-MS) using atmospheric pressure electrospray ionization in positive mode.

Inorganic Analytical Methods

Trace Elements by ICP-MS – EPA 1638
Inductively coupled plasma-mass spectrophotometer was used in the analysis of water samples. No digestion was required prior to analysis for dissolved elements in water samples. The method measures ions produced by a radio frequency inductively coupled

plasma. Analyte species originating in a liquid were nebulized and the resulting aerosol transported by plasma gas and introduced by means of an interface into a mass spectrometer. The ions produced in the plasma were sorted according to their mass-to charge ratios and quantified with a channel electron multiplier. Interferences were assessed and valid corrections applied or the data was flagged to indicate problems. Interference correction included compensation for background ions contributed by the plasma gas, reagents, and constituents of the sample matrix.

Samples were run with no dilution. Standard curves were run for all elements of concern. All samples, standards, SRM's, and blanks were made up in a 1-2 % Nitric acid solution. Blanks, standard reference materials, matrix spikes and calibration standards were run with all samples.

Ammonia – EPA 350.3
Ammonia was determined by use of an ion selective electrode (ISE) specific for the ammonium ion. The electrode used a hydrophobic, gas permeable membrane, which separated the sample from an internal ammonium chloride solution. The sample ammonia diffused through the membrane and adjusted the pH of the internal solution. This change was translated into a relative millivolt reading displayed on the pH/ISE meter.

Color - SM 2120B Mod
Color was determined using an automated colorimetric method equivalent to the visual comparison method, SM 2120B. Potassium hexachloroplatinate and cobalt(II) chloride hexahydrate were used to prepare the color standards. The samples and standards were buffered at pH 6.8 during analysis and the product read at 410nm. Because color is pH dependent, the pH at which color was determined was reported with results.

Ortho-phosphate – EPA 365.1 Mod
Ortho-phosphate was determined using an automated colorimetric method accomplished by flow injection analysis. The ortho-phosphate in the sample reacted with ammonium molybdate and antimony tartrate under acidic conditions. The product was then reduced by ascorbic acid to produce a blue color read at 880nm.

Nitrate + Nitrite as N – EPA 353.2
Nitrate plus nitrite was determined using an automated colorimetric method accomplished by flow injection analysis. The sample was passed through a cadmium column and the nitrate reduced to nitrite. The nitrite then reacted with sulfanilamide and N-(1-naphthyl)ethlyenediamine dihydrochloride forming a pink color which was read at 520 nm.

TDS – SM 2540 C
A representative sample aliquot was filtered through a glass fiber filter. The filtrate was then evaporated in a pre-weighed dish and then dried to constant weight at 180°C. The difference between the final dish weight and initial dish weight represented the total dissolved solids.

Turbidity – SM 2130B
The method was based upon a comparison of the intensity of light scattered by a sample under defined conditions with the intensity of light scattered by a standard reference suspension of formazin.

Hardness – SM 2340C
Hardness was defined as the sum of the calcium and magnesium concentrations, both expressed as calcium carbonate in mg/L. The sample with Calmagite indicator was pink in color when buffered to pH 10.0. EDTA was added as the titrant, and the Calmagite complexes of calcium and magnesium dissociated to form their more stable EDTA complex. At the end point, the solution turns blue as a result of the dissociated Calmagite. The amount of EDTA used therefore provides a measure of calcium and magnesium in the water.

Table 6 summarizes the analytical methods and laboratory detection and reporting requirements for all the constituents except Water Column Toxicity and Sediment Toxicity.

DFG Aquatic Toxicology Laboratory (ATL) conducted water column toxicity testing during the irrigation season. Acute toxicity testing was conducted using the invertebrate *Ceriodaphnia dubia* and the larval fathead minnow *Pimephales promelas* according to standard USEPA (2002a) acute toxicity methods. In addition to identifying toxicity caused by herbicides, 96-hour tests with the green algae *Selenastrum capricornutum* were conducted according to standard USEPA (2002b) methods.

Sediment Pesticide analysis

The extraction method for the sediment was a modification of USEPA Method #3550, Sonication Extraction for low concentrations of organics and pesticides. Approximately 20 g (±1.0 g) of sediment were removed, spiked with 50ng each of surrogates, dibromooctoflourobiphenyl (DBOFB) and decachlorobiphenyl (DCBP) and dried with anhydrous magnesium sulfate. In case of high sulfur content sediment, 2g of activated copper metal were added to remove sulfur residue. The sample was sonicated with 50 ml of 50:50 methylene chloride:acetone (v/v) for 5 minutes in 3 s pulse mode using a high intensity ultrasonic processor (Model VCX 400, Sonics and Materials Inc., Newtown, CT, USA), decanted and filtered through a Whatman No. 41 filter paper filled with anhydrous magnesium sulfate. This procedure was repeated twice more with a sonication time of 3 minutes. The extract was then collected in an evaporative tube and reduced in volume to approximately 5 ml, under a stream of nitrogen in a TurboVap II evaporator (Zymark, Hopkinton, MA). After cooling, the extract was solvent exchanged with hexane and the volume further reduced to 2 ml.

A deactivated Florisil column was used to remove interference from the extract. The column was packed with 10g Florisil partially deactivated by mixing with distilled water (6% w/v) and a 1cm layer of anhydrous sodium sulfate was used to cap the Florisil. After

the concentrated extract was transferred into the Florisil column, pesticides were eluted from the column with 50 mL of 30% diethyl ether in hexane solution (v/v). The eluent was concentrated, dissolved in 2 mL of hexane and transferred to clean screw-cap vials, sealed with a Teflon lined lid and stored at -4°C until analysis on the GC. Additional dilution steps may have been needed for some field-collected agricultural samples due to elevated pesticide concentrations.

Sediment samples were analyzed for the following pesticides: alpha-, beta-, delta-, and gamma-BHC, alpha- and gamma-chlordane, aldrin, endosulfan I and II, endosulfan sulfate, dieldrin, endrin, endrin aldehyde, endrin ketone, heptachlor, methoxychlor, heptachlor epoxide, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, chlorpyrifos, *cis* and *trans* – permethrin, bifenthrin, esfenvalerate lambda-cyhalothrin, cypermethrin, cyfluthrin, and deltamethrin. The detection limit for all analytes was 1 ng/g (or less if determined achievable in preliminary tests). The method validation was conducted with control sediment spiked with each of the target pesticides. Analyses were conducted using a Hewlett Packard 6890 Series Gas Chromatograph System (HP6890GC) equipped with an electron capture detector (ECD).

Metals analysis

Analysis for metals was performed on those samples determined to be toxic and an equal number of randomly selected non-toxic samples. The total number of samples selected for metals analysis did not exceed 50% of the samples collected. Analyses were done by ICP for Al, As, Cu, Cd, Cr, Ni, Pb, Se and Zn. Detection limits for these analytes range from 1-5 mg/kg (except 20-25 mg/kg for Al and Se). Analytical work was performed by the East Bay Municipal Utility District Laboratory, Oakland, CA following EPA Method 6010.

CNH analysis

Inorganic carbon was removed from the sample by: 1) drying at 100^{o}C overnight; 2) grinding the sample with a mortar and pestle; 3) exposure to hydrochloric acid vapors overnight); 4) driving off re-adsorbed water by drying at 100^{o}C for 2-4 hr; and 5) storage of sample at –20^{o}C or in a dessicator until analysis. CHN analysis ere done by the Horn Point Environmental Laboratory, University of Maryland, Cambridge, MD using a CE-440 Elemental Analyzer from Exeter Analytical.

Grain Size analysis

The sediment was washed on a series of stacked brass or stainless steel sieves (1000, 500, 250, 125, and 63 µm), and the material passing through the smallest sieve collected in a large stainless steel bowl. The contents of each sieve were transferred to an aluminum pan, dried at 100°C overnight and weighed. The contents of the bowl (representing the silt and clay fraction) were allowed to settle for 24-48 hr, the overlying water poured off, and the particles transferred to an aluminum pan for drying and weighing.

Toxicity testing

Sediment toxicity was assessed using a 10-day survival and growth test with *Hyalella azteca* (EPA 600/R-99/064). U.S. EPA, as a standard test for sediment toxicity testing has promulgated this test.

Table 6. Laboratory Detection and Reporting Limit Requirements

MediumName	MethodName	AnalyteName	FractionName	Units	ChemAgency Code	MDL	RL	INSTRUMENTATION
GENERAL PARAMETERS								
samplewater	SM 2120B Mod	Color	None	Color Units	DFG-WPCL	2.0	5.0	FIA
samplewater	SM 2130B	Turbidity	None	NTU	DFG-WPCL	1	1	Nephelometer
samplewater	SM 2540C	Solids	Total Dissolved	mg/L	DFG-WPCL	10	10	
samplewater	EPA 415.1	Organic Carbon	Total	mg/L	DFG-WPCL	0.2	0.5	
PATHOGENS								
samplewater	Quantitray	E Coli	None	MPN/100mL	Contract Lab			
TRIHALOMETHANES (THM)								
samplewater	EPA 8260	Chloroform	None	µg/L	DFG-WPCL	0.05	2	GC-MS/Purge and Trap
samplewater	EPA 8260	Bromoform	None	µg/L	DFG-WPCL	0.2	2	GC-MS/Purge and Trap
samplewater	EPA 8260	Dibromochloromethane	None	µg/L	DFG-WPCL	0.08	2	GC-MS/Purge and Trap
samplewater	EPA 8260	Bromodichloromethane	None	µg/L	DFG-WPCL	0.06	2	GC-MS/Purge and Trap
TRACE ELEMENTS								
samplewater	EPA 1638	Arsenic	Dissolved/Total	µg/L	MPSL-DFG	0.10	0.30	ICP-MS
samplewater	EPA 1638	Boron	Dissolved/Total	µg/L	MPSL-DFG	1	5	ICP-MS
samplewater	EPA 1638	Cadmium	Dissolved/Total	µg/L	MPSL-DFG	0.002	0.01	ICP-MS
samplewater	EPA 1638	Copper	Dissolved/Total	µg/L	MPSL-DFG	0.003	0.01	ICP-MS
samplewater	EPA 1638	Lead	Dissolved/Total	µg/L	MPSL-DFG	0.006	0.01	ICP-MS
samplewater	EPA 1638	Nickel	Dissolved/Total	µg/L	MPSL-DFG	0.006	0.02	ICP-MS
samplewater	EPA 1638	Phosphorous	Dissolved/Total	µg/L	MPSL-DFG	1.0	3.0	ICP-MS
samplewater	EPA 1638	Selenium	Dissolved/Total	µg/L	MPSL-DFG	0.10	0.30	ICP-MS
samplewater	EPA 1638	Zinc	Dissolved/Total	µg/L	MPSL-DFG	0.02	0.06	ICP-MS
INORGANIC (CONVENTIONAL ANALYTES)								
samplewater	EPA 350.3	Ammonia as N	None	mg/L	DFG-WPCL	0.04	0.1	ISE
samplewater	EPA 351.2	Nitrogen as N, Total Kjeldahl (TKN)	None	mg/L	DFG-WPCL	0.12	0.25	FIA
samplewater	EPA 353.2	Nitrate+nitrite as N	None	mg/L	DFG-WPCL	0.005	0.01	FIA
samplewater	EPA 353.2	Nitrite as N	None	mg/L	DFG-WPCL	0.005	0.01	FIA
samplewater	EPA 365.1Mod	Phosphate as P, Ortho	None	mg/L	DFG-WPCL	0.005	0.01	FIA
ORGANOCHLORINE PESTICIDES								
samplewater	EPA 608/8081A	DDD(o,p')	None	µg/L	DFG-WPCL	0.001	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	DDD(p,p')	None	µg/L	DFG-WPCL	0.001	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	DDE(o,p')	None	µg/L	DFG-WPCL	0.001	0.005	GC-ECD/GC-MS

Table 6. Laboratory Detection and Reporting Limit Requirements (Continued)

MediumName	MethodName	AnalyteName	FractionName	Units	ChemAgency Code	MDL	RL	INSTRUMENTATION
samplewater	EPA 608/8081A	DDE(p,p')	None	µg/L	DFG-WPCL	0.001	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	DDT(o,p')	None	µg/L	DFG-WPCL	0.001	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	DDT(p,p')	None	µg/L	DFG-WPCL	0.002	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	Dicofol	None	µg/L	DFG-WPCL	0.05	0.1	GC-ECD/GC-MS
samplewater	EPA 608/8081A	Dieldrin	None	µg/L	DFG-WPCL	0.001	0.002	GC-ECD/GC-MS
samplewater	EPA 608/8081A	Endrin	None	µg/L	DFG-WPCL	0.002	0.005	GC-ECD/GC-MS
samplewater	EPA 608/8081A	Methoxychlor	None	µg/L	DFG-WPCL	0.001	0.002	GC-ECD/GC-MS
HERBICIDES								
samplewater	EPA 619	Atrazine	None	µg/L	DFG-WPCL	0.02	0.05	GC-NPD/GC-MS
samplewater	EPA 619	Cyanazine	None	µg/L	DFG-WPCL	0.02	0.05	GC-NPD/GC-MS
samplewater	EPA 547	Glyphosate	None	µg/L	DFG-WPCL	2.0	5.0	HPLC-FLUORESENCE
samplewater	WPCL	Molinate	None	µg/L	DFG-WPCL	0.1	0.2	GC-NPD/GC-MS
samplewater	WPCL	Paraquat dichloride	None	µg/L	DFG-WPCL	0.2	0.5	HPLC-MS
samplewater	EPA 619	Simazine	None	µg/L	DFG-WPCL	0.02	0.05	GC-NPD
samplewater	WPCL	Thiobencarb	None	µg/L	DFG-WPCL	0.1	0.2	GC-NPD/GC-MS
CARBAMATE PESTICIDES/HERBICIDES								
samplewater	EPA 632 Mod	Aldicarb	None	µg/L	DFG-WPCL	0.01	0.05	HPLC-MS
samplewater	EPA 632 Mod	Captan	None	µg/L	DFG-WPCL	0.05	0.1	HPLC-MS
samplewater	EPA 632 Mod	Carbaryl	None	µg/L	DFG-WPCL	0.01	0.02	HPLC-MS
samplewater	EPA 632 Mod	Carbofuran	None	µg/L	DFG-WPCL	0.01	0.02	HPLC-MS
samplewater	EPA 632 Mod	Diuron	None	µg/L	DFG-WPCL	0.002	0.005	HPLC-MS
samplewater	EPA 632 Mod	Linuron	None	µg/L	DFG-WPCL	0.002	0.005	HPLC-MS
samplewater	EPA 632 Mod	Methiocarb	None	µg/L	DFG-WPCL	0.15	0.25	HPLC-MS
samplewater	EPA 632 Mod	Methomyl	None	µg/L	DFG-WPCL	0.01	0.02	HPLC-MS
PYRETHROID PESTICIDES								
samplewater	EPA 1660 Mod	Biphenthrin	None	µg/L	DFG-WPCL	0.005	0.01	GC-ECD/GC-MS
samplewater	EPA 1660 Mod	Cyfluthrin	None	µg/L	DFG-WPCL	0.005	0.01	GC-ECD/GC-MS
samplewater	EPA 1660 Mod	Cypermethrin	None	µg/L	DFG-WPCL	0.01	0.05	GC-ECD/GC-MS
samplewater	EPA 1660 Mod	Esfenvalerate/Fenvalerate	None	µg/L	DFG-WPCL	0.002	0.01	GC-ECD/GC-MS
samplewater	EPA 1660 Mod	Permethrin	None	µg/L	DFG-WPCL	0.01	0.02	GC-ECD/GC-MS
ORGANOPHOSPHATE PESTICIDES								
samplewater	EPA 8140,8141A	Azinphos-Methyl	None	µg/L	DFG-WPCL	0.03	0.05	GC-FPD
samplewater	EPA 8140,8141A	Chlorpyrifos	None	µg/L	DFG-WPCL	0.003	0.005	GC-FPD
samplewater	EPA 8140,8141A	Diazinon	None	µg/L	DFG-WPCL	0.003	0.005	GC-FPD

Table 6. Laboratory Detection and Reporting Limit Requirements (Continued)

MediumName	MethodName	AnalyteName	FractionName	Units	ChemAgency Code	MDL	RL	INSTRUMENTATION
samplewater	EPA 8140,8141A	Dimethoat	None	µg/L	DFG-WPCL	0.03	0.05	GC-FPD
samplewater	EPA 8140,8141A	Disulfoton	None	µg/L	DFG-WPCL	0.01	0.05	GC-FPD
samplewater	EPA 8140,8141A	Malathion	None	µg/L	DFG-WPCL	0.03	0.05	GC-FPD
samplewater	EPA 8140,8141A	Methamidophos	None	µg/L	DFG-WPCL	0.10	0.2	GC-FPD
samplewater	EPA 8140,8141A	Methidathion	None	µg/L	DFG-WPCL	0.03	0.05	GC-FPD
samplewater	EPA 8140,8141A	Methyl Parathion	None	µg/L	DFG-WPCL	0.01	0.05	GC-FPD
samplewater	EPA 8140,8141A	Parathion	None	µg/L	DFG-WPCL	0.01	0.02	GC-FPD
samplewater	EPA 8140,8141A	Phorate	None	µg/L	DFG-WPCL	0.05	0.2	GC-FPD
samplewater	EPA 8140,8141A	Phosmet	None	µg/L	DFG-WPCL	0.05	0.2	GC-FPD

QUALITY ASSURANCE PROCEDURES

Quality assurance samples are collected and analyzed to guarantee that the data generated during the analytical phase of the project fulfill Quality Control specifications for precision, accuracy, representativeness, comparability and completeness (PARC). Three types of quality assurance samples were evaluated: field blanks, field duplicates and matrix spike samples. Field blanks were generated to demonstrate that neither the sampling procedures nor atmospheric exposure resulted in contaminated samples. Field blanks were collected at a rate of 5% of the total number of samples along with the associated environmental sample. Field blanks were assigned randomly to sampling sites and were distinguished from the environmental sample through a time offset of 1 minute. Water used for the blanks consisted of deionized water from the Institute of Ecology, UC Davis for all blanks except the blanks established for metals and water column toxicity. MilliQ water was used for the metal samples, and tap water from the DFG ATL for the toxicity samples.

Field duplicate samples demonstrate the precision of the analytical process. Duplicates were collected in rapid succession and in an identical manner to the associated environmental sample. Duplicates were collected at a rate of 5% of the total samples and were assigned randomly to sample sites. Duplicates were distinguished from the environmental sample through a time offset of 3 minutes. For cases where contaminants were detected in both samples, the assessment of the difference in concentration between the environmental sample and the paired replicate was determined by calculating the relative percent difference between the two values, which is defined as:

$$RPD = (([C_{env} - C_{rep}] / ([C_{env} + C_{rep}]/2)) * 100$$

RPD = the relative percent difference
C_{env} = concentration of pesticide in environmental sample
C_{rep} = concentration of pesticide in replicate sample.

If an RPD greater than 25% is confirmed by reanalysis, the environmental results were qualified as estimated.

The purpose of analyzing matrix spikes and matrix spike duplicates was to demonstrate the performance of the analytical method in a particular sample matrix. Matrix spike and matrix spike duplicate samples were collected at a rate of 5%, assigned randomly to sites and labeled with a time offset of 9 minutes. Recovery is the accuracy of an analytical test measured against a known analyte addition to a sample.

Recovery is calculated as follows:

Recovery = ((Matrix plus spike result – Matrix result) * 100) / expected Matrix plus spike result

If matrix spike recovery of any analyte was outside of the acceptable range, the result was determined to have failed the acceptance criteria (80-120%).

RESULTS

PESTICIDES

One hundred and thirty surface water samples were collected for each of the five pesticide groups: organochlorine (OCH) pesticides, organophosphate (OP) pesticides, pyrethroids, carbamates and herbicides. The most commonly detected pesticide was chlorpyrifos (37%), followed by diuron (18%), diazinon (17%), and dimethoate (16%). The frequencies of detection for the other pesticides ranged between 0 - 7%. The concentrations for detected compounds varied widely, ranging from detectable levels to 9.72 µg/L of aldicarb at Spring Creek at Walnut Drive.

Within the OC pesticides, DDE (p, p') was detected most often with a frequency of 7% and at the same time showed the highest detection value of 0.06 µg/L at Orestimba Creek at Kilburn Road. Over all, OC pesticide detections were rare and only occurred at four sites: Drain to Grant Line Canal off Wing Levee Road, Willow Slough at Road 99, Orestimba Creek at Kilburn Road and the Poso drain site.

OP pesticides were detected in the greatest frequency of the five classes of pesticides with chlorpyrifos (37%), diazinon (17%) and dimethoate (16%) being the most common. OP's were detected at 19 of the 31 sites (Antelope Creek at Kansas Avenue, Yankee Slough at Swanson Road, Unnamed Drain of Walker Creek on Co. Rd 28, Spring Creek at Walnut Drive, Hamilton Slough at Highway 99, Willow Slough at Road 99, Drain to Grant Line Canal off Wing Levee Road, Drain to North Canal at South Bonetti Road, Mormon Slough at Jack Tone Road, Orestimba Creek at Kilburn Road, Dry Creek at J9, Drain to Pixley Slough at Eightmile Road, Stevinson Lower Lateral at the intersection of Faith Home Road and Turner Road, Poso Island at the intersection of Turner Island Road and Palasso Road, Duck Slough at Arboleda Drive, Button Ditch on Ave 368 west of Alta Ave, West Reedley Ditch at East Adams Ave, Kings River at Jackson Ave Bridge, and Tule River at Poplar Ave). The highest concentration detected of any OP was 1.2 µg/L of dimethoate at the Drain to Grant Line Canal off Wing Levee Road.

Pyrethroids were detected at Orestimba Creek at Kilburn Road and the Stevenson Lower Lateral at the intersection of Faith Home Road and Turner Road, both in the northern San Joaquin Valley, with a single detect at each site. In each case the pyrethroid detected was bifenthrin; 0.012 µg/L at Orestimba Creek at Kilburn Road and 0.018 µg/L at Stevenson Lower Lateral at the intersection of Faith Home Road and Turner Road.

Carbamates were found at 8 of the 31 sites. The most detected carbamate was methomyl with a frequency of 5%. The highest concentration detected of any carbamate was 9.72 µg/L of aldicarb at Spring Creek at Walnut Drive.

Thirteen of the 31 sites showed herbicide detections. Diuron was measured with a frequency of 18%. During the whole sampling period, diuron was found at almost every

sampling event at the three Delta locations (Drain to San Joaquin River off south Manthey Road, Drain to Grant Line Canal off Wing Levee Road, Drain to North Canal at south Bonetti Road) and the Poso drain. Diuron also showed the highest concentration of any herbicide with 0.95 µg/L at the Drain to San Joaquin River off south Manthey Road.

Tab. 7 Summary of Pesticides detected during the Irrigation Season 2004. No values indicate results below the RL and MDL.

Site ID	Date	Time	DDD(o,p')	DDD(p,p')	DDE(o,p')	DDE(p,p')	DDT(o,p')	DDT(p,p')	Dicofol	Dieldrin	Endrin	Methoxychlor	Azinphos methyl	Chlorpyrifos	Diazinon	Dimethoate	Disulfoton	Malathion	Methidathion	Parathion, Methyl	Phorate	Phosmet	Parathion, Ethyl [a]
			Organochlorine Pesticides										Organophosphate Pesticides										
CS03	7/12/2004	9:50												**0.036**									
CS09	7/27/2004	12:50																					
CS09	8/24/2004	10:10																					
CS10	7/13/2004	11:20												**0.042**									
CS10	7/27/2004	14:20												**0.017**	**0.250**								
CS10	8/10/2004	13:00												**0.045**									
CS10	8/24/2004	11:20												**0.038**	**0.009**								
CS10	9/7/2004	11:40												**0.040**	**0.005**			**0.150**					
CS12	7/12/2004	11:30												**0.167**	**0.059**								
CS12	7/26/2004	10:30												**0.009**	**0.009**								
CS12	8/9/2004	11:30												**0.060**	**0.015**								
CS12	8/23/2004	9:40												**0.020**									
CS12	9/8/2004	11:30												**0.015**									
CS13	7/22/2004	8:30																					
CS15	7/12/2004	13:50												**0.035**									
CS15	7/26/2004	12:20												**0.400**	**0.008**								
CS15	8/9/2004	13:50													**0.016**								
CS15	8/23/2004	11:00																					
CS15	9/8/2004	13:20																					
CS21	8/24/2004	8:50												**0.007**									
D01	7/21/2004	8:40														**0.087**							
D01	8/3/2004	9:00														**0.087**							
D01	8/17/2004	9:30														**0.079**							
D01	8/31/2004	10:00																					
D01	9/14/2004	10:50														**0.050**							
D02	7/21/2004	9:40				**0.005**										**0.400**	**0.129**						
D02	8/3/2004	10:30													**0.018**	**1.200**	**0.100**						
D02	8/17/2004	11:00				**0.006**				**0.008**				**0.009**		**0.100**	**0.090**						
D02	8/31/2004	11:20															**0.260**						
D02	9/14/2004	11:30															**0.050**						
D03	7/21/2004	10:50													**0.029**	**0.700**							
D03	8/3/2004	13:30													**0.022**	**0.480**							
D03	8/17/2004	12:20												**0.020**									
D03	8/31/2004	12:20												**0.060**		**0.120**	**0.140**						
D03	9/14/2004	12:50												**0.041**									
FT05	7/22/2004	7:30												**0.284**		**0.045**							
FT05	8/2/2004	13:40												**0.040**									
FT05	8/16/2004	15:00												**0.022**	**0.012**								
FT08	7/22/2004	9:10												**0.005**									
FT13	8/16/2004	7:20												**0.013**									
FT14	7/20/2004	11:30												**0.006**									
FT14	8/16/2004	9:00												**0.010**		**0.100**							

Tab. 7 Summary of Pesticides detected during the Irrigation Season 2004, continued. No values indicate results below the RL and MDL.

Site ID	Date	Time	DDD(o,p')	DDD(p,p')	DDE(o,p')	DDE(p,p')	DDT(o,p')	DDT(p,p')	Dicofol	Dieldrin	Endrin	Methoxychlor	Azinphos methyl	Chlorpyrifos	Diazinon	Dimethoate	Disulfoton	Malathion	Methidathion	Parathion, Methyl	Phorate	Phosmet	Parathion, Ethyl [a]
			Organochlorine Pesticides										Organophosphate Pesticides										
NS04	8/12/2004	9:30												0.024				0.182					
NS04	8/30/2004	9:00												0.014									
NSJ06	7/14/2004	8:50												0.010									
NSJ06	8/11/2004	9:00													0.011								
NSJ06	8/25/2004	10:50												0.035	0.052								
NSJ06	9/8/2004	10:40												0.020									
NSJ18	7/15/2004	13:40														0.246							
NSJ18	7/29/2004	15:00	0.005	0.006	0.005	0.049	0.011	0.027		0.007					0.080	1.00							
NSJ18	8/12/2004	9:40		0.010		0.060	0.010	0.026		0.010				0.280	0.020								
NSJ18	8/26/2004	13:00		0.007		0.030	0.005	0.010		0.005				0.025	0.006	0.500				0.045			
NSJ18	9/9/2004	12:40												0.030		0.200							
NSJ24	7/20/2004	13:40												0.017		0.325							
NSJ24	8/4/2004	14:50												0.030									
NSJ24	8/18/2004	12:40												0.056									
NSJ24	9/1/2004	13:00												0.011									
NSJ28	7/14/2004	10:20														0.132							
NSJ28	7/28/2004	10:30														0.503							
NSJ28	8/11/2004	10:00																					
NSJ28	8/25/2004	9:30												0.115									
NSJ28	9/8/2004	9:30												0.050									
NSJ29	7/15/2004	12:10												0.005	0.005								
NSJ29	7/29/2004	12:50																					
SS03	7/8/2004	13:40				0.007				0.005						0.114							
SS03	7/22/2004	14:30				0.005										0.190							
SS03	8/5/2004	14:40				0.006																	
SS03	8/19/2004	12:00												0.011									
SS03	9/2/2004	11:30												0.032									
SS04	7/27/2004	15:10																					
SS04	8/10/2004	14:00																					
SS07	7/8/2004	11:30																					
SSJ01	8/17/2004	9:30																					
SSJ08	7/15/2004	9:50												0.009									
SSJ08	7/29/2004	9:50				0.008		0.007						0.023									
SSJ08	8/12/2004	14:30												0.050	0.011								
SSJ08	8/26/2004	10:40												0.017	0.009								
SSJ08	9/9/2004	10:20												0.042	0.011								
SSJ12	8/4/2004	10:20																					
SSJ12	8/18/2004	10:50												0.054	0.014								
Maximum value			0.005	0.01	0.005	0.06	0.011	0.027		0.01				0.4	0.25	1.2	0.26	0.182		0.045			
Median			0.005	0.007	0.005	0.007	0.01	0.01818		0.007				0.0276	0.0128	0.19	0.1145	0.166		0.045			
90th percentile			0.005	0.009	0.005	0.051	0.011	0.027		0.009				0.077	0.058	0.700	0.200	0.179		0.045			
Total amount of samples			130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
Frequency %			1%	2%	1%	7%	2%	3%		4%				37%	17%	16%	5%	2%		1%			

Tab. 7 Summary of Pesticides detected during the Irrigation Season 2004, continued. No values indicate results below the RL and MDL.

Site ID	Date	Time	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Permethrin	*lambda* Cyhalothrin	Aldicarb	Captan	Carbaryl	Carbofuran	Methiocarb	Methomyl	Atrazine	Cyanazine	Diuron	Linuron	Molinate	Simazine	Thiobencarb
			Pyrethroid Pesticides						Carbamate Pesticides						Herbicides						
CS03	7/12/2004	9:50																			
CS09	7/27/2004	12:50																	**0.550**		
CS09	8/24/2004	10:10																	**0.159**		**0.060**
CS10	7/13/2004	11:20																			
CS10	7/27/2004	14:20															**0.040**				
CS10	8/10/2004	13:00																			
CS10	8/24/2004	11:20															**0.110**				**0.105**
CS10	9/7/2004	11:40																			
CS12	7/12/2004	11:30									**0.146**										
CS12	7/26/2004	10:30																			
CS12	8/9/2004	11:30																			
CS12	8/23/2004	9:40																			
CS12	9/8/2004	11:30									**0.250**										
CS13	7/22/2004	8:30												**0.120**							
CS15	7/12/2004	13:50																			
CS15	7/26/2004	12:20									**0.240**										
CS15	8/9/2004	13:50																			
CS15	8/23/2004	11:00							**5.00**												
CS15	9/8/2004	13:20							**9.72**												
CS21	8/24/2004	8:50																			
D01	7/21/2004	8:40															**0.950**				
D01	8/3/2004	9:00															**0.216**				
D01	8/17/2004	9:30															**0.400**				
D01	8/31/2004	10:00															**0.316**				
D01	9/14/2004	10:50																			
D02	7/21/2004	9:40															**0.300**				
D02	8/3/2004	10:30															**0.198**				
D02	8/17/2004	11:00															**0.350**				
D02	8/31/2004	11:20															**0.130**				
D02	9/14/2004	11:30													**0.052**		**0.054**				
D03	7/21/2004	10:50															**0.642**				
D03	8/3/2004	13:30															**0.165**				
D03	8/17/2004	12:20															**0.080**				
D03	8/31/2004	12:20										**0.104**			**0.052**		**0.916**				
D03	9/14/2004	12:50																			
FT05	7/22/2004	7:30																			
FT05	8/2/2004	13:40																			
FT05	8/16/2004	15:00																			
FT08	7/22/2004	9:10																			
FT13	8/16/2004	7:20																			
FT14	7/20/2004	11:30																			
FT14	8/16/2004	9:00																			

Tab. 7 Summary of Pesticides detected during the Irrigation Season 2004, continued. No values indicate results below the RL and MDL.

Site ID	Date	Time	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Permethrin	*lambda* Cyhalothrin	Aldicarb	Captan	Carbaryl	Carbofuran	Methiocarb	Methomyl	Atrazine	Cyanazine	Diuron	Linuron	Molinate	Simazine	Thiobencarb
			Pyrethroid Pesticides						Carbamate Pesticides						Herbicides						
NS04	8/12/2004	9:30																			
NS04	8/30/2004	9:00																			
NSJ06	7/14/2004	8:50															0.020				
NSJ06	8/11/2004	9:00																			
NSJ06	8/25/2004	10:50															0.030				
NSJ06	9/8/2004	10:40																			
NSJ18	7/15/2004	13:40																			
NSJ18	7/29/2004	15:00	0.012																		
NSJ18	8/12/2004	9:40																			0.203
NSJ18	8/26/2004	13:00												0.920			0.056				
NSJ18	9/9/2004	12:40												0.139							
NSJ24	7/20/2004	13:40																			
NSJ24	8/4/2004	14:50									0.256										
NSJ24	8/18/2004	12:40																			
NSJ24	9/1/2004	13:00																			
NSJ28	7/14/2004	10:20																			
NSJ28	7/28/2004	10:30																			
NSJ28	8/11/2004	10:00																		0.078	
NSJ28	8/25/2004	9:30																			
NSJ28	9/8/2004	9:30																			
NSJ29	7/15/2004	12:10																			
NSJ29	7/29/2004	12:50	0.018																		
SS03	7/8/2004	13:40																			
SS03	7/22/2004	14:30																			
SS03	8/5/2004	14:40																		0.060	
SS03	8/19/2004	12:00																			
SS03	9/2/2004	11:30																			
SS04	7/27/2004	15:10																			0.250
SS04	8/10/2004	14:00																			0.246
SS07	7/8/2004	11:30													0.048						
SSJ01	8/17/2004	9:30																		0.059	
SSJ08	7/15/2004	9:50															0.226				
SSJ08	7/29/2004	9:50															0.168				
SSJ08	8/12/2004	14:30												0.550			0.120				
SSJ08	8/26/2004	10:40												2.25			0.100				
SSJ08	9/9/2004	10:20												0.169			0.146				
SSJ12	8/4/2004	10:20										0.316									
SSJ12	8/18/2004	10:50																			
Maximum value			0.018						9.72		0.256	0.316		2.25	0.052		0.95		0.55	0.078	0.25
Median			0.015						7.36		0.245	0.21		0.3595	0.0518		0.165		0.3545	0.06	0.203
90th percentile			0.017						9.248		0.254	0.295		1.585	0.052		0.594		0.511	0.074	0.248
Total amount of samples			130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
Frequency %			2%						2%		3%	2%		5%	2%		18%		2%	2%	4%

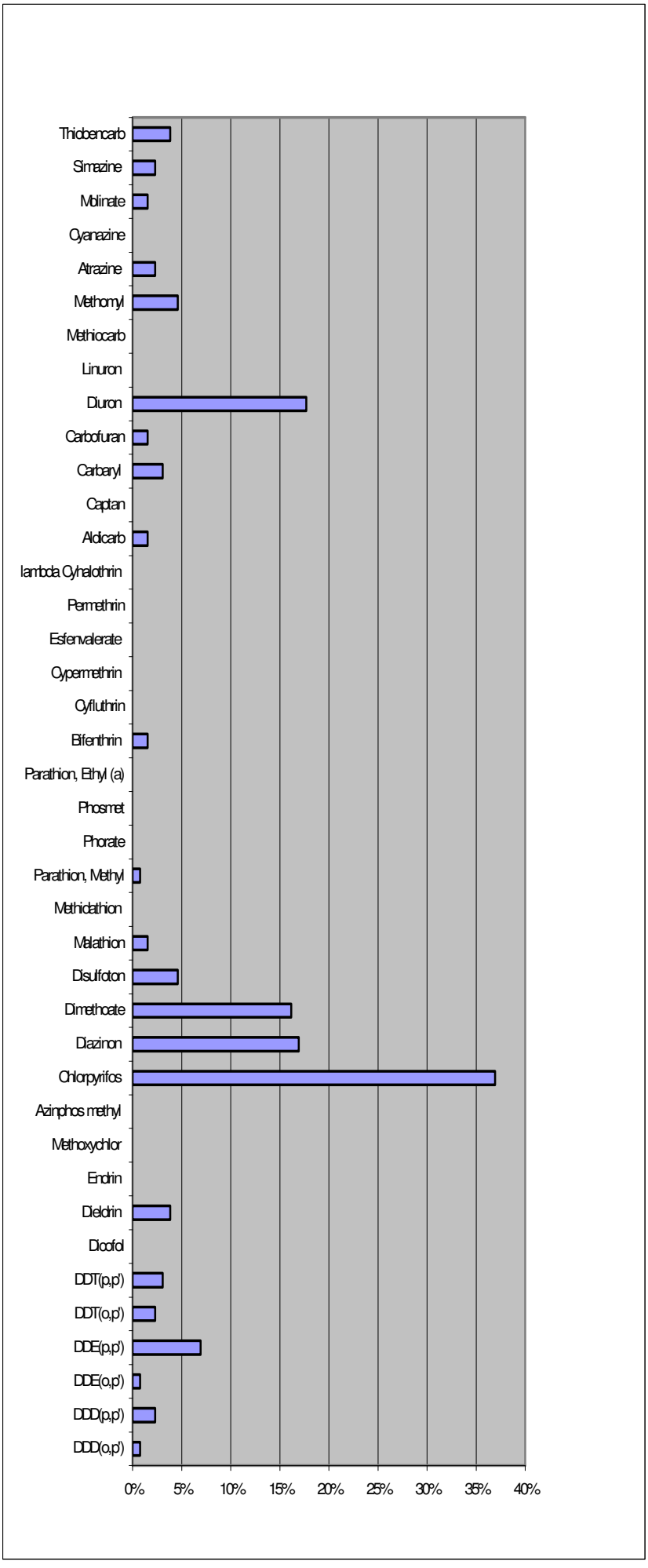

Table 8. Frequency of pesticide detection, in percent

WATER COLUMN TOXICITY

One hundred twenty three water column samples were collected and tested for acute toxicity (Table 9). One half of the 96-hr tests with the algae *Selenastrum capricornutum* resulted in significantly different growth of the sample compared to the control group. Acute tests run with *Ceriodaphnia dubia* resulted in 100% mortality in 5 out of 123 water samples (4%). Acute toxicity (statistically significantly different from control) was found at the drain to Walker Creek at County Road 28, Spring Creek at Walnut Drive, the ditch at the SW corner of Levee Road and Riego Road, Orestimba Creek at Kilburn Road, and Button ditch on Ave 368 west of Alta Ave.

One sample collected at the drain to Grant Line Canal off Wing Levee Road showed significant different survival rate (65%) of the *Ceriodaphnia* compared to the control. Hamilton Slough at Highway 99 (80%) and Willow Slough at Road 99 (87.5%) experienced significantly reduced survival of fathead minnows compared to controls.

Table 9. Summary of Water Column Toxicity detected during the Irrigation Season 2004

Site ID	Date	Time	***Selenastrum capricornutum*** **(Y indicates significant different growth to control group)**	***Ceriodaphnia dubia*** **96-hour survival (in %)**	***Pimephales promelas*** **96-hour survival (in %)**
CS03	07/12/04	9:50	**Y**		
CS03	09/08/04	10:00	**Y**		
CS09	07/27/04	12:50	**Y**		
CS09	08/10/04	11:30	**Y**		
CS09	08/24/04	10:10	**Y**		
CS09	09/07/04	10:20	**Y**		
CS10	07/13/04	11:20	**Y**		
CS10	07/27/04	14:20	**Y**		
CS10	08/10/04	13:00	**Y**		
CS10	08/24/04	11:20	**Y**		
CS10	09/07/04	10:40	**Y**		
CS12	07/12/04	11:30	**Y**	**0**	
CS12	07/26/04	10:30	**Y**		
CS12	08/09/04	11:30	**Y**		
CS13	07/22/04	8:30	**Y**		
CS13	08/05/04	8:50	**Y**		
CS13	08/19/04	9:40	**Y**		

Table 9. Summary of Water Column Toxicity detected during the Irrigation Season 2004 (continued)

Site ID	Date	Time	*Selenastrum capricornutum* (Y indicates significant different growth to control group)	*Ceriodaphnia dubia* 96-hour survival (in %)	*Pimephales promelas* 96-hour survival (in %)
CS15	07/12/04	13:50	**Y**		
CS15	07/26/04	12:20	**Y**	**0**	
CS15	08/09/04	13:50	**Y**		
CS21	07/13/04	9:10	**Y**		
CS21	07/27/04	10:00	**Y**		
CS21	08/10/04	9:50	**Y**		**80**
CS21	09/07/04	9:10	**Y**		
D02	7/21/2004	9:40	**N**	**65**	
FT05	07/22/04	7:30	**Y**	**0**	
FT08	07/22/04	9:10	**Y**		
FT08	08/03/04	8:40	**Y**		
FT13	07/20/04	13:40	**Y**		
FT13	08/02/04	8:00	**Y**		
FT13	08/16/04	7:20	**Y**		
FT14	07/20/04	10:40	**Y**		
FT14	08/16/04	9:00	**Y**		
NS04	09/16/04	9:50	**Y**		
NS07	08/12/04	11:30	**Y**		
NS07	09/16/04	11:40	**Y**		
NSJ06	07/14/04	8:50	**Y**		
NSJ06	07/28/04	9:30	**Y**		
NSJ06	08/11/04	9:00	**Y**		
NSJ06	08/25/04	10:50	**Y**		
NSJ06	09/08/04	10:40	**Y**		
NSJ18	08/12/04	9:40	**N**	**0**	
NSJ24	07/20/04	13:40	**Y**		
NSJ24	08/04/04	14:50	**Y**		
NSJ24	08/18/04	12:40	**Y**		
NSJ24	09/15/04	13:00	**Y**		
NSJ24	09/01/04	13:00	**Y**		
NSJ26	07/20/04	12:00	**Y**		
NSJ26	08/04/04	12:40	**Y**		
NSJ26	08/18/04	11:40	**Y**		
NSJ26	09/01/04	12:00	**Y**		
NSJ26	09/15/04	11:50	**Y**		
NSJ28	09/08/04	9:30	**Y**		
SS03	7/22/2004	14:30	**N**		**87.5**
SS04	07/27/04	15:10	**Y**	**0**	
SS04	08/10/04	14:00	**Y**		
SS04	08/24/04	12:50	**Y**		
SS07	08/05/04	12:10	**Y**		
SSJ01	07/22/04	12:00	**Y**		
SSJ01	08/03/04	11:30	**Y**		
SSJ01	08/17/04	9:30	**Y**		
SSJ12	07/20/04	10:00	**Y**		
SSJ12	08/04/04	10:20	**Y**		
SSJ12	08/18/04	10:50	**Y**		
SSJ12	09/15/04	9:50	**Y**		
Total amount of samples			**123**	**123**	**123**
Frequency %			**50%**	**4%**	**0%**

NUTRIENTS, PHYSICAL PARAMETER AND HARDNESS RESULTS

Over the whole sampling period 123 water samples each were collected and analyzed for nutrients, physical parameters and hardness (Table 10). Nutrients included ammonia-N, nitrate-nitrite, nitrite and orthophosphate. Physical parameters include color, total dissolved solids and turbidity.

Ammonia was detected with a frequency of 21% and the maximum concentration found was 1.774 mg/L at the drain on AFB Farms. Nitrate - nitrite was found at 23 of 31 sites. A sample from the Stevenson Lower Lateral had the highest concentration with 8.34 mg/L. Nitrite was only detected with a frequency of 35%, the maximum concentration of 0.332 mg/L was found at Orestimba Creek at Kilburn Road. Besides the highest found ammonia detection, the drain to Grant Line Canal off Wing Levee Road also had the highest concentration of orthophosphate of 0.772 mg/L. Orthophosphate was detected with a frequency of 88%. Color was seen at all sites except Stony Creek. Maximum color was 113. The maximum value for TDS was 902 mg/L, which occurred at drain to Grant Line Canal off Wing Levee Road. Most turbidity with 155 NTU was seen at Orestimba Creek, which also appeared to have the hardest water with 347 mg/L.

TOTAL ORGANIC CARBON (TOC), TEMPERATURE, PH, EC AND DO

During the 2004 irrigation season, 124 water samples were collected and analyzed for TOC, temperature, pH, DO, and EC (Table 11). The largest amount of TOC was 70.98 mg/L at the Poso Drain. The greatest water temperature found during the sampling period was 36.5ºC. The water at this site was not flowing and water samples were only collected for pesticide screening. Values for pH varied between 6.3 and 9.4. The highest value for EC was found at drain to Grant Line Canal off Wing Levee Road with 1392 µS. The lowest level found was 22.4 µS at the west Reedley Ditch site. Levels of DO varied between 0.1 mg/L (Ag drain on Robinson property) – 19.4mg/L (unnamed ditch at Levee Road and Riego Road).

TRIHALOMETHANES (THM)

Of the seventy water samples collected and analyzed for THM's, one sample was found to contain a detectable amount (0.296µg/L).

TRACE METALS

Metals data are still being analyzed by the lab and will be summarized in the next quarterly report.

SEDIMENT

Sediments were collected at 33 sites between August 9 and August 30, 2004. Each site was sampled once, following the protocol described in the Quality Assurance Project Plan. Briefly, the upper 1 cm of the sediment column was collected using a stainless steel scoop. Multiple scoops were taken until a total of 3 liters of sediment was collected. The sediment was thoroughly homogenized in the laboratory, and subsamples taken for

chemical analysis and toxicity testing. On rare occasions (2 samples), large amounts of gravel or plant debris necessitated sieving the sediment on a 1 mm screen. The material passing through the screen was tested, and the retained material discarded. For all other samples, the material was tested as received.

The majority of sites were located at the same point as where the water samples were taken. There were, however, three water sampling locations where sediment was not easily accessible because of deep water or rocky bottom, but suitable sediment collecting sites were available 1-3 km upstream or downstream along the same drain. Although near the water sampling site, these three sediment sampling sites were given new station designations: SED9 (near NSJ28), SED10 (near NSJ03), and SED11 (near D03).

A coalition group collected one additional site, Hospital Creek at River Road (HCRR), and a split was provided for analysis. This is one of the two sites that required 1 mm sieving. Results are presented in Appendix II.

Table 10. Summary of Inorganic Constituents detected during the Irrigation Season 2004. No values indicate no detections or values below the quantification limit.

Site ID	Date	Sample time	Ammonia as N (mg/L)	Nitrate + Nitrite as N (mg/L)	Nitrite as N (mg/L)	OrthoPhosphate as P (mg/L)	Color	Total Dissolved Solids (mg/L) (450mg/L)	Turbidity NTU	Hardness as $CaCO^3$ (mg/L)
CS03	07/12/04	9:50				**0.0115**		**173**	**4.9**	**128**
CS03	08/09/04	9:40				**0.011**		**167**	**0.65**	**125**
CS03	09/08/04	10:00				**0.011**		**178**	**1.7**	**139**
CS09	07/27/04	12:50				**0.019**	**15.8**	**89**	**19**	**61.6**
CS09	08/10/04	11:30				**0.017**	**19.5**	**85**	**9.6**	**58.1**
CS09	08/24/04	10:10				**0.0144**	**19**	**101**	**24**	**66.3**
CS09	09/07/04	10:20				**0.033**	**16**	**87**	**18**	**53.0**
CS10	07/13/04	11:20				**0.012**	**10.6**	**65**	**13**	**51.3**
CS10	07/27/04	14:20				**0.016**	**14.0**	**103**	**24**	**51.0**
CS10	08/10/04	13:00				**0.014**	**14.3**	**110**	**9.1**	**60**
CS10	08/24/04	11:20				**0.020**	**31**	**120**	**12**	**65.3**
CS10	09/07/04	11:40				**0.022**	**25**	**122**	**4.2**	**53.0**
CS12	07/12/04	11:30		**0.050**		**0.362**	**56.1**	**154**	**4.1**	**86.5**
CS12	07/26/04	10:30		**0.012**		**0.288**	**37.0**	**203**	**2.7**	**116**
CS12	08/09/04	11:30		**0.092**		**0.470**	**64.2**	**152**	**2.0**	**95.9**
CS12	08/23/04	9:40		**0.015**		**0.338**	**35.8**	**160**	**3.6**	**89.8**
CS12	09/08/04	11:30		**0.213**		**0.398**	**42**	**125**	**3.6**	**76.3**
CS13	07/08/04	9:10		**0.164**		**0.231**	**14.1**	**280**	**9.6**	**161**
CS13	07/22/04	8:30		**0.071**			**18.8**	**311**	**8.0**	**173**
CS13	08/05/04	8:50		**0.135**		**0.245**	**16.2**	**324**	**14**	**172**
CS13	08/19/04	9:40		**0.122**		**0.220**	**15.5**	**306**	**20**	**173**
CS13	09/02/04	8:20		**0.130**		**0.233**	**13**	**357**	**30**	**194**
CS15	07/12/04	13:50		**0.025**		**0.043**	**5.5**	**99**	**29**	**51.5**
CS15	07/26/04	12:20		**0.040**		**0.128**	**30.3**	**104**	**25**	**55.6**
CS15	08/09/04	13:50		**0.256**		**0.158**	**11.6**	**90**	**27.0**	**54.1**
CS21	07/13/04	9:10				**0.014**	**6.2**	**61**	**3.3**	**42.0**
CS21	07/27/04	10:00				**0.015**	**5.9**	**60**	**3.4**	**42.4**
CS21	08/10/04	9:50				**0.012**	**6.5**	**60**	**3.3**	**38.2**
CS21	08/24/04	8:50				**0.011**	**6**	**60**	**3.8**	**44.9**
CS21	09/07/04	9:10		**0.014**		**0.018**	**14**	**104**	**23**	**77.5**
D01	07/21/04	8:40	**0.769**	**0.109**	**0.037**	**0.332**	**45.8**	**526**	**39**	**224**
D01	08/03/04	9:00	**0.149**	**0.243**	**0.041**	**0.164**	**30.2**	**498**	**4.5**	**196**
D01	08/17/04	9:30	**0.926**			**0.577**	**113**	**559**	**18**	**222**
D01	08/31/04	10:00	**0.489**			**0.639**	**85**	**501**	**7.2**	**192**
D02	07/21/04	9:40	**0.326**	**1.710**	**0.070**	**0.354**	**22.0**	**647**	**66**	**284**
D02	08/03/04	10:30	**0.351**	**2.190**	**0.101**	**0.374**	**19.9**	**721**	**58**	**310**
D02	08/17/04	11:00	**0.797**	**1.950**	**0.139**	**0.468**	**24.3**	**902**	**17**	**390**
D02	08/31/04	11:20	**1.159**	**0.803**	**0.156**	**0.537**	**23**	**633**	**30**	**250**
D02	09/14/04	11:30	**1.774**	**0.964**	**0.141**	**0.772**	**36**	**782**	**7.0**	**325**
D03	07/21/04	10:50	**0.553**	**0.333**	**0.040**	**0.440**	**43.3**	**545**	**26**	**245**
D03	08/03/04	13:30	**0.447**	**0.826**	**0.220**	**0.289**	**55.9**	**578**	**38**	**224**
D03	08/17/04	12:20	**1.29**	**1.510**	**0.208**	**0.331**	**32.4**	**565**	**28**	**232**
D03	08/31/04	12:20	**0.386**	**0.027**		**0.525**	**60**	**497**	**15**	**219**
D03	09/14/04	12:50	**0.786**	**0.149**	**0.020**	**0.672**	**48**	**663**	**29**	**245**

Table 10. Summary of Inorganic Constituents detected during the Irrigation Season 2004. No values indicate no detections or values below the quantification limit. (continued)

Site ID	Date	Sample time	Ammonia as N (mg/L)	Nitrate + Nitrite as N (mg/L)	Nitrite as N (mg/L)	OrthoPhosphate as P (mg/L)	Color	Total Dissolved Solids (mg/L) (450mg/L)	Turbidity NTU	Hardness as $CaCO^3$ (mg/L)
FT08	07/22/04	9:10		**0.016**			**5.4**	**20**	**1.4**	**8.0**
FT08	08/03/04	8:40		**0.015**				**24**	**1.2**	**9.2**
FT13	07/20/04	14:10				**0.0225**	**7.7**	**40**	**7.2**	**16.3**
FT13	08/02/04	8:00					**5.6**	**31**	**13**	**12.2**
FT13	08/16/04	7:20					**6.0**	**109**	**17.0**	**102**
FT14	07/20/04	11:10				**0.022**	**10.7**	**99**	**8.8**	**58.1**
FT14	08/16/04	9:00				**0.013**	**6.7**	**50**	**16.0**	**22.4**
FT15	07/20/04	8:10		**3.710**	**0.046**	**0.015**	**3.6**	**254**	**33**	**135**
FT15	08/02/04	11:00		**2.690**	**0.038**			**270**	**32**	**21.4**
FT15	08/16/04	10:40		**2.810**	**0.035**		**6.8**	**248**	**9.2**	**120**
NS04	08/12/04	9:30		**0.842**	**0.016**	**0.081**	**69.0**	**199**	**0.65**	**81.6**
NS04	08/30/04	9:00		**0.442**		**0.090**	**49**	**188**	**0.90**	**81.6**
NS04	09/16/04	9:50		**0.083**		**0.119**	**100**	**223**	**0.90**	**82.8**
NS07	08/12/04	11:30		**0.010**		**0.032**	**16.4**	**126**	**1.6**	**63.8**
NS07	08/30/04	10:20		**0.019**		**0.049**	**20**	**145**	**1.8**	**69.4**
NS07	09/16/04	11:40		**0.013**		**0.069**	**9**	**138**	**0.90**	**64.6**
NSJ03	07/14/04	12:10	**0.109**	**0.201**	**0.011**	**0.059**	**35.3**	**372**	**8.2**	**215**
NSJ03	07/28/04	13:30		**0.169**	**0.011**	**0.067**	**49.0**	**365**	**6.0**	**182**
NSJ03	08/11/04	11:20	**0.135**	**0.401**	**0.016**	**0.061**	**58.0**	**310**	**19**	**160**
NSJ03	08/25/04	8:20		**0.229**	**0.022**	**0.101**	**28**	**484**	**4.4**	**235**
NSJ03	09/08/04	8:30		**0.078**		**0.091**	**24**	**612**	**7.3**	**318**
NSJ06	07/14/04	08:50				**0.010**	**6.7**	**127**	**15**	**83.1**
NSJ06	07/28/04	9:30					**7.8**	**126**	**9.1**	**82.8**
NSJ06	08/11/04	9:00					**7.1**	**119**	**6.8**	**83.0**
NSJ06	08/25/04	10:50					**11**	**120**	**5.1**	**81.6**
NSJ06	09/08/04	10:40					**7**	**119**	**4.6**	**72.8**
NSJ18	07/15/04	13:40	**0.237**	**4.810**	**0.332**	**0.136**	**12.8**	**328**	**155**	**175**
NSJ18	07/29/04	15:00	**0.106**	**3.260**	**0.048**	**0.155**	**13.5**	**436**	**120**	**204**
NSJ18	08/12/04	9:40		**5.180**	**0.018**	**0.113**	**10.8**	**539**	**100**	**302**
NSJ18	08/26/04	13:00		**5.480**	**0.019**	**0.120**	**17**	**533**	**60**	**271**
NSJ18	09/09/04	12:40		**6.460**	**0.042**	**0.133**	**21**	**642**	**50**	**347**
NSJ24	07/20/04	13:40		**0.032**		**0.560**	**60.6**	**106**	**7.2**	**42.3**
NSJ24	08/04/04	14:50		**0.021**		**0.370**	**48.4**	**90**	**15**	**33.3**
NSJ24	08/18/04	12:40		**0.024**		**0.612**	**59.7**	**106**	**6.8**	**28.6**
NSJ24	09/01/04	13:00		**0.026**		**0.279**	**50**	**96**	**15**	**39.1**
NSJ24	09/15/04	13:00		**0.056**		**0.256**	**44**	**91**	**7.4**	**36.4**
NSJ26	07/20/04	12:00		**0.013**		**0.030**	**25.4**	**54**	**5.7**	**30.6**
NSJ26	08/04/04	12:40		**0.031**		**0.021**	**24.7**	**62**	**20**	**40.4**
NSJ26	08/18/04	11:40		**0.059**		**0.042**	**32.2**	**60**	**4.8**	**42.8**
NSJ26	09/01/04	12:00		**0.0316**		**0.020**	**20**	**48**	**4.4**	**32.6**
NSJ26	09/15/04	11:50		**0.021**		**0.023**	**13**	**45**	**2**	**25.2**
NSJ28	07/14/04	10:20		**0.337**		**0.050**	**10.3**	**48**	**17**	**25.6**
NSJ28	07/28/04	10:30	**0.643**	**0.232**	**0.013**	**0.082**	**14.6**	**60**	**16**	**27.8**

Table 10. Summary of Inorganic Constituents detected during the Irrigation Season 2004. No values indicate no detections or values below the quantification limit. (continued)

Site ID	Date	Sample time	Ammonia as N (mg/L)	Nitrate + Nitrite as N (mg/L)	Nitrite as N (mg/L)	OrthoPhosphate as P (mg/L)	Color	Total Dissolved Solids (mg/L) (450mg/L)	Turbidity NTU	Hardness as $CaCO^3$ (mg/L)
NSJ29	07/15/04	12:10		**4.940**	**0.075**	**0.109**		**310**	**1.8**	**112**
NSJ29	07/29/04	12:50		**2.900**	**0.113**	**0.058**	**7.14**	**512**	**1.2**	**182**
NSJ29	08/12/04	12:10		**7.940**	**0.077**	**0.107**	**8.9**	**353**	**1.6**	**133**
NSJ29	08/26/04	11:50		**8.340**	**0.084**	**0.063**	**8**	**412**	**1.7**	**145**
NSJ29	09/09/04	11:30		**4.170**	**0.053**	**0.045**	**6**	**288**	**2.2**	**83.2**
SS03	07/08/04	13:40		**0.507**	**0.125**	**0.0306**	**10.0**	**176**	**18**	**144**
SS03	07/22/04	14:30	**0.184**	**0.930**	**0.068**		**27.0**	**269**	**46**	**187**
SS03	08/05/04	14:40	**0.192**	**0.916**	**0.050**	**0.114**	**22.4**	**344**	**50**	**190**
SS03	08/19/04	13:30		**1.140**	**0.059**	**0.073**	**24.9**	**343**	**31**	**204**
SS03	09/02/04	11:30		**0.928**	**0.042**	**0.091**	**25**	**347**	**50**	**224**
SS04	07/27/04	15:10				**0.054**	**20.9**	**170**	**18**	**112**
SS04	08/10/04	14:00				**0.053**	**21.7**	**196**	**9.2**	**124**
SS04	08/24/04	12:50				**0.087**	**27**	**218**	**6.5**	**128**
SS07	07/08/04	11:30	**0.104**	**0.806**	**0.0643**	**0.0725**	**17.2**	**248**	**70**	**185**
SS07	07/22/04	12:10		**0.730**	**0.098**		**7.9**	**173**	**8.0**	**135**
SS07	08/05/04	12:10		**0.180**	**0.0132**	**0.044**	**9.4**	**192**	**4.2**	**136**
SS07	08/19/04	12:00		**0.185**		**0.058**	**11.8**	**196**	**5.6**	**147**
SS07	09/02/04	10:20		**0.225**		**0.073**	**11**	**193**	**8.4**	**148**
SSJ01	07/22/04	12:00		**0.128**			**11.7**	**89**	**2.2**	**41.8**
SSJ01	08/03/04	11:30		**0.141**		**0.010**	**11.6**	**109**	**2.7**	**45.9**
SSJ01	08/17/04	9:30		**0.147**		**0.016**	**12.7**	**124**	**2.4**	**53.0**
SSJ08	07/15/04	09:50		**1.580**	**0.124**	**0.284**	**21.0**	**388**	**99**	**161**
SSJ08	07/29/04	9:50	**0.220**	**1.220**	**0.071**	**0.237**	**20.0**	**449**	**114.0**	**176**
SSJ08	08/12/04	14:30		**0.967**	**0.041**	**0.286**	**26.2**	**444**	**85**	**160**
SSJ08	08/26/04	10:40	**0.113**	**0.844**	**0.053**	**0.272**	**24**	**598**	**37**	**230**
SSJ08	09/09/04	10:20	**0.131**	**0.960**	**0.078**	**0.274**	**30**	**610**	**31**	**208**
SSJ12	07/20/04	10:00		**0.049**		**0.090**	**9.9**	**42**	**23**	**14.3**
SSJ12	08/04/04	10:20		**0.039**		**0.062**	**12.2**	**36**	**7.7**	**12.6**
SSJ12	08/18/04	10:50		**0.083**		**0.053**	**11.1**	**35**	**16.0**	**10.2**
SSJ12	09/01/04	10:20		**0.068**		**0.153**	**19**	**47**	**17**	**17.0**
SSJ12	09/15/04	9:50				**0.028**	**13**	**33**	**12**	**10.1**
Maximum value			**1.774**	**8.340**	**0.332**	**0.772**	**113**	**902**	**155**	**347**
Median			**1.159**	**0.193**	**0.050**	**0.082**	**17.95**	**154**	**9.2**	**110**
90th percentile			**1.651**	**3.485**	**0.139**	**0.436**	**49.51**	**547.8**	**46.8**	**245**
Total amount of samples			**123**	**123**	**123**	**123**	**123**	**123**	**123**	**123**
Frequency %			**21%**	**74%**	**35%**	**88%**	**95%**	**100%**	**100%**	**100%**

Table 11. Summary of Total Organic Carbon, Dissolved Oxygen, pH and EC found during the Irrigation Season 2004. No values for Total Organic Carbon indicate no detections, NA means not available.

Site ID	Date	Time	Total Organic Carbon, mg/L	Temperature in Celsius	pH	EC (uS)	Dissolved Oxygen (mg/L)
CS03	07/12/04	9:50	**1.00**	**27.6**	**8.73**	**310**	**8.3**
CS03	07/26/04	9:30	**18.21**	**26.1**	**8.17**	**316**	**8.3**
CS03	08/09/04	9:40	**32.01**	**27.4**	**8.13**	**304**	**8.4**
CS03	08/23/04	9:00	**NA**	**24.4**	**8.21**	**296**	**8.5**
CS03	09/08/04	10:00	**0.64**	**25.5**	**8.14**	**314**	**7.4**
CS09	07/27/04	12:50	**12.89**	**24.0**	**6.67**	**141.4**	**5.3**
CS09	08/10/04	11:30	**11.02**	**21.3**	**6.91**	**138**	**6.5**
CS09	08/24/04	10:10	**12.62**	**21.1**	**6.94**	**169.7**	**6.5**
CS09	09/07/04	10:20	**2.92**	**22.1**	**6.86**	**147**	**2.3**
CS10	07/13/04	11:20	**2.20**	**23.8**	**7.34**	**108.8**	**7**
CS10	07/27/04	14:20	**10.52**	**27.3**	**6.93**	**176.2**	**6.3**
CS10	08/10/04	13:00	**9.85**	**24.4**	**7.61**	**198.7**	**13.4**
CS10	08/24/04	11:20	**10.94**	**21.9**	**7.03**	**184**	**7.6**
CS10	09/07/04	11:40	**3.04**	**22.2**	**7.05**	**195**	**6.6**
CS12	07/12/04	11:30	**6.30**	**24.0**	**7.25**	**229**	**5.7**
CS12	07/26/04	10:30	**NA**	**23.9**	**7.23**	**324**	**4.2**
CS12	08/09/04	11:30	**20.32**	**23.3**	**7.19**	**263**	**5.4**
CS12	08/23/04	9:40	**19.55**	**21.1**	**7.1**	**252**	**4.3**
CS12	09/08/04	11:30	**3.63**	**22.1**	**7.26**	**196**	**4.6**
CS13	07/08/04	9:10		**22.2**	**7.13**	**475**	**1.6**
CS13	07/22/04	8:30	**3.70**	**24.2**	**7.05**	**511**	**2.3**
CS13	08/05/04	8:50	**31.16**	**21.6**	**7.28**	**490**	**2.2**
CS13	08/19/04	9:40	**28.87**	**21.9**	**7.19**	**462**	**2.5**
CS13	09/02/04	8:20	**2.49**	**20.0**	**7.34**	**536**	**2.6**
CS15	07/12/04	13:50		**26.2**	**7.47**	**129.7**	**5.3**
CS15	07/26/04	12:20	**15.16**	**25.5**	**7.46**	**149.7**	**6.4**
CS15	08/09/04	13:50	**17.79**	**26.1**	**7.73**	**135.6**	**4.4**
CS15	08/23/04	11:00	**NA**	**21.8**	**6.52**	**449**	**1.4**
CS15	09/08/04	13:20	**NA**	**23.7**	**6.28**	**1145**	**0.5**
CS21	07/13/04	9:10	**1.40**	**17.8**	**7.41**	**98.9**	**8.3**
CS21	07/27/04	10:00	**6.67**	**18.1**	**6.98**	**99.6**	**8.7**
CS21	08/10/04	9:50	**7.34**	**17.6**	**7.13**	**98.8**	**8.8**
CS21	08/24/04	8:50	**7.60**	**17.1**	**7.04**	**98.6**	**8.7**
CS21	09/07/04	9:10	**1.99**	**18.9**	**7.13**	**198.2**	**6.2**
D01	07/21/04	8:40	**8.60**	**21.6**	**6.79**	**878**	**1.4**
D01	08/03/04	9:00	**25.85**	**21.0**	**7.36**	**786**	**1.9**
D01	08/17/04	9:30	**47.46**	**24.5**	**7.13**	**845**	**0.4**
D01	08/31/04	10:00	**36.37**	**22.0**	**6.9**	**757**	**0.1**
D01	09/14/04	10:50	**NA**	**16.8**	**6.82**	**853**	**0.4**
D02	07/21/04	9:40	**7.00**	**23.2**	**7.26**	**1063**	**6.6**
D02	08/03/04	10:30	**26.82**	**21.4**	**7.37**	**1153**	**3.9**
D02	08/17/04	11:00	**26.45**	**23.4**	**7.4**	**1392**	**3.4**
D02	08/31/04	11:20	**47.99**	**23.7**	**7.12**	**995**	**1.3**
D02	09/14/04	11:30	**7.18**	**20.9**	**7.26**	**1265**	**3.7**

Table 11. Summary of Total Organic Carbon, Dissolved Oxygen, pH and EC found during the Irrigation Season 2004. No values for Total Organic Carbon indicate no detections, NA means not available. (continued)

Site ID	Date	Time	Total Organic Carbon, mg/L	Temperature in Celsius	pH	EC (uS)	Dissolved Oxygen (mg/L)
D03	07/21/04	10:50	**11.00**	**22.6**	**6.91**	**932**	**0.6**
D03	08/03/04	13:30	**27.80**	**19.9**	**7.05**	**867**	**0.3**
D03	08/17/04	12:20	**23.51**	**21.9**	**6.97**	**880**	**0.3**
D03	08/31/04	12:20	**31.27**	**22.4**	**6.82**	**795**	**14.5**
D03	09/14/04	12:50	**7.83**	**19.2**	**6.85**	**1010**	**0.6**
FT05	07/22/04	7:30	**1.10**	**25.8**	**7.44**	**29.9**	**6.47**
FT05	08/02/04	13:40	**4.31**	**28.4**	**9.27**	**73.8**	**9.1**
FT05	08/16/04	15:00	**NA**	**36.5**	**9.43**	**68.5**	**12.6**
FT08	07/22/04	9:10		**18.9**	**8.4**	**22.4**	**9.62**
FT08	08/03/04	8:40	**4.29**	**19.8**	**7.02**	**29.8**	**9.1**
FT08	08/17/04	8:00	**NA**	**21.7**	**7.89**	**257**	**4.2**
FT13	07/20/04	14:10	**1.10**	**28.6**	**7.26**	**48.9**	**7.51**
FT13	08/02/04	8:00	**3.10**	**24.7**	**6.52**	**38.7**	**5.9**
FT13	08/16/04	7:20	**9.81**	**25.8**	**6.6**	**128.1**	**6.5**
FT14	07/20/04	11:20	**3.00**	**27.8**	**8.46**	**148.3**	**7.65**
FT14	08/16/04	9:00	**6.77**	**25.7**	**7.02**	**67.7**	**6.3**
FT15	07/20/04	8:00	**1.10**	**27.6**	**8.07**	**404.2**	**10.4**
FT15	08/02/04	11:00	**9.94**	**24.6**	**8.51**	**375**	**7.9**
FT15	08/16/04	10:40	**9.39**	**26.8**	**8.63**	**368**	**9**
NS04	08/12/04	9:30	**22.49**	**22.3**	**7.29**	**260**	**4.9**
NS04	08/30/04	9:00	**18.68**	**21.4**	**7.17**	**254**	**4.9**
NS04	09/16/04	9:50	**10.44**	**19.8**	**7.07**	**277**	**5.6**
NS07	08/12/04	11:30	**11.65**	**23.5**	**7.93**	**191**	**7.3**
NS07	08/30/04	10:20	**13.58**	**21.1**	**7.75**	**202**	**8**
NS07	09/16/04	11:40	**0.94**	**19.8**	**7.86**	**197.7**	**8.1**
NSJ03	07/14/04	12:10		**21.6**	**7.26**	**720**	**4.6**
NSJ03	07/28/04	13:30	**27.79**	**22.9**	**7.28**	**626**	**7**
NSJ03	08/11/04	11:20	**23.90**	**21.2**	**7.14**	**555**	**4.7**
NSJ03	08/25/04	8:20	**28.27**	**19.4**	**7.19**	**804**	**5.3**
NSJ03	09/08/04	8:30	**5.00**	**20.0**	**7.27**	**1060**	**2.3**
NSJ06	07/14/04	08:50	**2.50**	**26.0**	**8.97**	**200**	**8.6**
NSJ06	07/28/04	9:30	**13.00**	**27.1**	**8.36**	**196**	**8.2**
NSJ06	08/11/04	9:00	**11.34**	**26.7**	**8.42**	**190**	**8.4**
NSJ06	08/25/04	10:50	**10.11**	**25.4**	**8.41**	**192**	**8.3**
NSJ06	09/08/04	10:40	**2.53**	**25.4**	**8.48**	**195**	**11**
NSJ18	07/15/04	13:40	**1.70**	**23.2**	**7.91**	**584**	**6.4**
NSJ18	07/29/04	15:00	**16.76**	**24.0**	**7.84**	**592**	**7.1**
NSJ18	08/12/04	9:40	**24.64**	**22.5**	**7.99**	**796**	**8**
NSJ18	08/26/04	13:00	**22.91**	**21.9**	**7.96**	**775**	**10.9**
NSJ18	09/09/04	12:40	**2.51**	**22.8**	**7.99**	**937**	**14.4**
NSJ24	07/20/04	13:40	**10.00**	**26.6**	**7.3**	**137.7**	**8.3**
NSJ24	08/04/04	14:50	**13.40**	**23.9**	**7.22**	**103.4**	**7.4**
NSJ24	08/18/04	12:40	**13.24**	**24.0**	**7.13**	**132.4**	**7.1**
NSJ24	09/01/04	13:00	**5.58**	**23.6**	**7.29**	**122.2**	**7**
NSJ24	09/15/04	13:00	**5.80**	**20.5**	**7.07**	**116.3**	**7.4**

Table 11. Summary of Total Organic Carbon, Dissolved Oxygen, pH and EC found during the Irrigation Season 2004. No values for Total Organic Carbon indicate no detections, NA means not available. (continued)

Site ID	Date	Time	Total Organic Carbon, mg/L	Temperature in Celsius	pH	EC (uS)	Dissolved Oxygen (mg/L)
NSJ26	07/20/04	12:00	**2.80**	**22.9**	**6.82**	**80.8**	**6.2**
NSJ26	08/04/04	12:40	**8.33**	**22.3**	**6.93**	**90.5**	**10.2**
NSJ26	08/18/04	11:40	**7.96**	**21.4**	**6.78**	**80.7**	**6.5**
NSJ26	09/01/04	12:00	**1.76**	**21.5**	**6.89**	**69.9**	**6.8**
NSJ26	09/15/04	11:50	**1.64**	**18.9**	**6.99**	**69.5**	**7.7**
NSJ28	07/14/04	10:20	**1.80**	**21.6**	**6.98**	**70.1**	**6.5**
NSJ28	07/28/04	10:30	**8.62**	**21.8**	**6.76**	**87.9**	**8.1**
NSJ28	08/11/04	10:00	**6.19**	**21.8**	**6.79**	**77.1**	**6.3**
NSJ28	08/25/04	9:30	**6.11**	**20.4**	**6.58**	**75.4**	**12.2**
NSJ28	09/08/04	9:30	**1.47**	**21.0**	**6.77**	**66.2**	**6.1**
NSJ29	07/15/04	12:10	**1.40**	**23.4**	**7.56**	**548**	**7**
NSJ29	07/29/04	12:50	**18.83**	**25.0**	**8.51**	**809**	**NA**
NSJ29	08/12/04	12:10	**17.29**	**23.8**	**7.5**	**552**	**6.9**
NSJ29	08/26/04	11:50	**15.94**	**22.8**	**7.83**	**679**	**9.1**
NSJ29	09/09/04	11:30	**1.12**	**23.7**	**7.85**	**446**	**8.3**
SS03	07/08/04	13:40	**5.4**	**25.9**	**8.28**	**432**	**7.5**
SS03	07/22/04	14:30	**9.80**	**26.7**	**7.75**	**445**	**10.8**
SS03	08/05/04	14:40	**35.65**	**24.6**	**7.95**	**473**	**7.5**
SS03	08/19/04	13:30	**27.20**	**25.6**	**7.95**	**500**	**6.5**
SS03	09/02/04	11:30	**6.15**	**22.2**	**7.92**	**537**	**7.5**
SS04	07/27/04	15:10	**19.31**	**28.8**	**7.59**	**265**	**9.6**
SS04	08/10/04	14:00	**20.89**	**25.9**	**7.8**	**319**	**19.4**
SS04	08/24/04	12:50	**21.67**	**26.1**	**7.9**	**333**	**9.6**
SS07	07/08/04	11:30	**2.3**	**23.8**	**8.58**	**314**	**8.1**
SS07	07/22/04	12:10	**4.60**	**25.0**	**8.43**	**NA**	**NA**
SS07	08/05/04	12:10	**21.73**	**25.2**	**8.83**	**304**	**14.8**
SS07	08/19/04	12:00	**21.81**	**26.5**	**8.55**	**316**	**8.5**
SS07	09/02/04	10:20	**3.21**	**23.7**	**8.15**	**321**	**8.1**
SSJ01	07/22/04	12:00	**3.40**	**26.7**	**8.14**	**149.1**	**8.15**
SSJ01	08/03/04	11:30	**10.95**	**23.1**	**7.28**	**187.2**	**8.2**
SSJ01	08/17/04	9:30	**12.07**	**23.3**	**7.56**	**184**	**6**
SSJ08	07/15/04	09:50	**3.90**	**22.2**	**7.41**	**657**	**4.6**
SSJ08	07/29/04	9:50	**70.98**	**21.4**	**7.23**	**703**	**5.5**
SSJ08	08/12/04	14:30	**19.35**	**27.2**	**7.36**	**656**	**4.9**
SSJ08	08/26/04	10:40	**21.48**	**21.7**	**7.41**	**939**	**8.8**
SSJ08	09/09/04	10:20	**5.68**	**21.7**	**7.45**	**964**	**4.2**
SSJ12	07/20/04	10:00	**2.10**	**22.3**	**6.69**	**40.5**	**7.3**
SSJ12	08/04/04	10:20	**5.51**	**21.7**	**6.8**	**38.5**	**8.9**
SSJ12	08/18/04	10:50	**4.32**	**21.8**	**6.66**	**33.3**	**7.6**
SSJ12	09/01/04	10:20	**2.65**	**23.7**	**6.55**	**39.1**	**6.6**
SSJ12	09/15/04	9:50	**1.84**	**20.3**	**6.55**	**28.4**	**6.1**
Maximum value			**70.98**	**36.5**	**9.4**	**1392.0**	**19.4**
Median			**9.8**	**23.0**	**7.3**	**263.0**	**7.0**
90th percentile			**27.4**	**26.7**	**8.4**	**878.4**	**9.6**
Total amount of samples			**124.0**				
Frequency %			**96%**				

QA/QC

Between July 8 and September 16, 2004, 650 water samples were collected for analysis of five different classes of pesticides (Appendix I). Thirty-three field duplicates were collected, of which none exceeded the RPD of 25%. Thirty-two field blanks were also collected during that period, of which non showed detections.

Seven field duplicates and six field blanks were collected for 123 water column toxicity samples. Comparisons of the field duplicates with their environmental samples showed the same results for all seven samples, either both had significant different growth or survival to the control group or not. All field blanks that consisted of tap water from the DF&G ATL laboratory showed significantly different growth of the algae *Selenastrum capricornutum* compared to the control group. The water had no effect on the survival of the *Ceriodaphnia* or fathead minnow. Water conditions of the tap water are assumed to be responsible for the significant different algae growth.

For the 123 samples collected, 20 additional quality control samples were collected for nutrients and 18 for physical parameters, and 6 field duplicates were collected for hardness. Two blank samples for turbidity resulted in values at or slightly above the reporting limit (0.05 and 0.1 NTU). Two of seven field duplicates for turbidity were above 25% RPD (31% and 46%), which could be resulting from stratified water during sampling. Five samples were spiked by the lab for color. The mean of the matrix spike recoveries was 94.5% and the standard deviation was 8.5.

None of the 6 field duplicates collected for nutrients exceeded relative percent differences of 25%. Two of the 7 field blanks had detectable, but not quantifiable amounts of ammonia (0.04 DNQ and 0.082 DNQ mg/L). Seven samples were spiked for the physical parameters. Mean recovery and standard deviation for ammonia is 98.4% ±7.4%, for nitrate+nitrite 99.1% ±3.6%, for nitrite 101.5% ±2.7% and for orthophosphate 101% ±6%. Six field duplicates were collected for hardness; none of those exceeded the RPD of 25%.

One hundred twenty four water samples were analyzed for total organic carbon and 19 additional samples were collected for quality control. None of the six field duplicates showed relative percent differences higher than 25%. Three of the field blank samples showed carbon detections, but the values were below the detection limit. The matrix spike had recovery rates between 100% and 105%.

During the irrigation season 2004, 70 samples were collected for trihalomethanes (THM). In addition 10 quality control samples were collected, 3 Field Duplicates, 4 Field Blanks and 3 Matrix Spike samples. None of the Field Blanks had detectable amounts of any constituent. All Field Duplicates met the data Quality Objective for repeatability. Percent recovery of the four matrix spikes varied between 80 and 117%.

Detections of pesticides occurred during the split sampling (Table 12). All classes of pesticides analyzed were detected although not all sites had all analytes detected.

Organophosphate pesticides were the most commonly detected analytes in the split samples. No toxicity was detected in the two split samples collected for water column toxicity (Table 13). Toxicity was detected in the sediment split sample and the results are provided in Appendix II.

Table 12. Summary of Pesticides detected during Coalition split sampling in the Irrigation Season 2004. No values indicate results below the RL a MDL.

Site ID	Date	Time	DDD(o,p')	DDD(p,p')	DDE(o,p')	DDE(p,p')	DDT(o,p')	DDT(p,p')	Dicofol	Dieldrin	Erin	Methoxychlor	Azinphos methyl	Chlorpyrifos	Diazinon	Dimethoate	Disulfoton	Malathion	Methidathion	Parathion, Methyl	Phorate	Phosmet	Parathion, Ethyl [a]
			Organochlorine Pesticides										Organophosphate Pesticides										
Hospital Creek at River Rd	9/13/2004	8:00				0.016		0.005						0.012	0.006	0.085							
Lone Tree Creek at Jack Tone Rd	9/23/2004	13:40												0.015									
Duck Slough at Gurr Rd	9/29/2004	9:40													0.020	0.084							
Mid Supply Water at Gurr Rd	9/29/2004	9:50																					

Site ID	Date	Time	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate	Permethrin	Aldicarb	Captan	Carbaryl	Carbofuran	Methiocarb	Methomyl	Atrazine	Cyanazine	Diuron	Linuron	Molinate	Simazine	Thiobencarb
			Pyrethroid Pesticides					Carbamate Pesticides						Herbicides						
Hospital Creek at River Rd	9/13/2004	8:00						0.410					0.695							
Lone Tree Creek at Jack Tone Rd	9/23/2004	13:40																		
Duck Slough at Gurr Rd	9/29/2004	9:40				0.450								0.470						
Mid Supply Water at Gurr Rd	9/29/2004	9:50												0.139						

Table 13. Summary of Water Column Toxicity detected during the Coalition split sampling in the Irrigation Season 2004

Site ID	Date	Time	*Selenastrum capricornutum* (Y indicates significant different growth to control group)	*Ceriodaphnia dubia* 96-hour survival (in %)	*Pimephales promelas* 96-hour survival (in %)
Lone Tree Creek at Jack Tone Rd	9/23/2004	13:40	N	95.0%	97.5%
Duck Slough at Gurr Rd	9/29/2004	9:40	N	85.0%	85.0%

DISCUSSION

A comprehensive chemical analysis of all samples was not conducted. The design of the monitoring called for a broad spatial and temporal coverage of the Central Valley with a suite of analytes that would represent the constituents most likely to be found in discharge from irrigated agriculture at specific sites.

Currently, no data are available on the amount of any of the pesticides applied in any of the watersheds. However, no DDT has been applied in the Central Valley since the late 1970's. There were detections of DDT and DDE at 4 locations in the Delta and San Joaquin watershed. Similarly, a USGS study performed in 1993 (Panshin et al. 1998) found DDE (p,p') in a frequency of 23% at 4 sites, the Merced River at River Road, San Joaquin River at Vernalis, Orestimba Creek at River Road, and Salt Slough at Highway 165. The maximum concentration from that study was 0.062 µg/L at Orestimba Creek, similar to the maximum concentration of 0.060 µg/L found at Orestimba Creek during sampling for this study. These results indicate that little attenuation of the DDE signal has occurred over the last decade.

In an attempt to determine if various watershed features could facilitate the movement of pesticides to surface waters, we quantified the number of irrigated and non-irrigated acres in each watershed that drained to the sample locations, and the length of the various hydrological features that are found in each watershed. Response variables in the analysis included a series of binomial variables: pesticide detection, organochlorine detection, organophosphate detection, carbamate detection, pyrethroid detection, and herbicide detection. Multiple logistic regression was used in an attempt to establish relationships between the response variables and the predictor variables. The presence of any pesticide detection was not related to any landscape variable. However, the probability of pyrethroid detection was negatively related to the presence of water bodies that serve as both supply and drain channels. Similarly, the probability of carbamate detection was negatively related to the number of irrigated acres in the watershed. However, the percent of correctly classified cases was only 29% indicating that these variables were only marginal predictors of the presence of the respective pesticide detections.

Of the 123 samples tested for toxicity, 6 exhibited significant toxicity to *Ceriodaphnia* and two samples exhibited significant toxicity to *Pimephales*. However, half of the tests resulted in significant differences in algal growth between the ambient sample and the control. Results of the toxicity tests for *Ceriodaphnia* and *Pimephales* are more concordant with the results of the water quality analyses. At only one site, Willow Slough at Road 99, was toxicity observed with no detectable pesticides in the water samples. All other instances of toxicity were associated with detections of pesticides, and at all but one site, the ditch at the corner of Levee Road and Riego Road, multiple pesticide detections occurred. Carbaryl, dimethoate, chlorpyrifos, and diazinon were commonly associated with positive toxicity tests, with DDE, thiobencarb, and disulfoton

also being associated with positive toxicity tests. Interestingly, thiobencarb, an herbicide, was the only pesticide present in the sample collected at the ditch at the corner of Levee Road and Riego Road with 0% survival of *Ceriodaphnia*.

References:

CRWQCB, 2003 October, History of the Conditional Waivers of Waste Discharge Requirements for Discharge from Irrigated Lands, Fact Sheet http://www.swrcb.ca.gov/rwqcb5/programs/irrigated_lands/Factsheet_History_101003.pdf

CRWQCB, Monitoring and Reporting Program Order No. R5-2003-0826 http://www.swrcb.ca.gov/rwqcb5/adopted_orders/Waivers/R5-2003-0826-mrp_qapp.pdf

CRWQCB, 2003 October, Irrigated Land News, Issue 1 http://www.swrcb.ca.gov/rwqcb5/programs/irrigated_lands/newslet_101003.pdf

Harrelson, C.C., Rawlins, C.L., Potyondy, J.P., 1994, Stream channel reference sites: an illustrated guide to field technique. Gen. Tech. Rep. RM-245. USDA Forest Service

http://www.encyclopedia.com/html/C/CentrV1.asp 10/06/04

USEPA. 2002a. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. Weber CI, des, EPA/821/R/02/012. Environmental Monitoring Systems Laboratory, Office of Research and Development. US Environmental Protection Agency, Washington, DC, USA.

USEPA. 2002b. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms, Fourth Edition. EPA-821-R-02-013. Office of Water (4303T). US Environmental Protection Agency, Washington, CD, USA.

USEPA 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates. 2nd ed. EPA 600/R-99-064

Water Quality Investigation Program, Investigation of Water Quality in Agricultural Drains in the Central Valley http://www.swrcb.ca.gov/rwqcb5/programs/irrigated_lands/UCDStudyPlan3-07-03.pdf

APPENDIX I. QUALITY ASSURANCE/QUALITY CONTROL

- Mean percent recoveries and standard deviation of percent recoveries for pesticide quality assurance Lab Control Spikes and Matrix Spikes
- Summary of Pesticide Field QA / QC data for the Irrigation Season 2004 (in µg/L). Organochlorine Pesticides
- Summary of Pesticide Field QA / QC data for the Irrigation Season 2004 (in µg/L). Organophosphate Pesticides
- Summary of Pesticide Field QA / QC data for the Irrigation Season 2004 (in µg/L). Pyrithroids
- Summary of Pesticide Field QA / QC data for the Irrigation Season 2004 (in µg/L). Carbamates
- Summary of Pesticide Field QA / QC data for the Irrigation Season 2004 (in µg/L). Herbicides
- Summary of TOC Field QA / QC data for the Irrigation Season 2004
- Summary of Nutrients, Physical Parameter and Hardness Field QA / QC data for the Irrigation Season 2004
- Summary of THM Field QA / QC data for the Irrigation Season 2004
- Summary of Hardness Field QA / QC data for the Irrigation Season 2004

Mean percent recoveries and standard deviation of percent recoveries for pesticide quality assurance Lab Control Spikes and Matrix Spikes.							
All Values are in percent.							
Organochlorine Pesticides by GC/ECD	**N (number of samples)***	**LCS/LCSD Mean**	**Standard deviation**		**N (number of samples)***	**MS/MSD Mean**	**Standard deviation**
DDD(o,p')	8	93.0	8.1		13	92.1	8.0
DDD(p,p')	8	89.4	11.7		11	93.2	10.6
DDE(o,p')	8	96.1	7.0		13	89.2	9.9
DDE(p,p')	8	98.0	12.2		10	89.9	10.3
DDT(o,p')	8	102.2	7.4		13	92.1	7.2
DDT(p,p')	8	109.1	9.7		13	102.1	11.2
Dicofol	8	100.7	7.6		13	99.2	8.2
Dieldrin	8	98.2	9.2		13	100.9	7.4
Endrin	8	98.4	10.0		13	101.7	8.9
Methoxychlor	8	116.7	6.7		13	107.4	9.3
Organophosphate Pesticides by GC/FPD							
Azinphos methyl	7	87.1	3.9		14	98.3	13.8
Chlorpyrifos	7	93.2	7.3		13	106.9	8.8
Diazinon	7	85.7	6.4		14	97.3	9.8
Dimethoate	7	83.4	3.9		12	92.3	9.9
Disulfoton	5	89.5	18.8		8	90.3	19.4
Malathion	7	86.5	8.1		14	98.3	10.8
Methidathion	7	84.4	5.0		14	100.1	10.7
Parathion, Methyl	7	91.8	13.0		14	99.3	6.6
Phorate	6	90.3	21.7		11	87.3	14.8
Phosmet	7	91.0	5.6		14	110.0	11.1
Parathion, Ethyl [(a)]	7	96.8	10.4		4	98.2	2.1
Pyrethroid Pesticides by GC/ECD							
Bifenthrin	8	93.5	7.4		16	91.9	10.0
Cyfluthrin	7	88.7	13.2		15	91.0	12.5
Cypermethrin	7	90.9	14.7		16	89.8	13.6
Esfenvalerate/Fenvalerate	8	98.7	6.4		16	98.0	9.5
Permethrin	8	98.5	9.2		17	93.0	11.9
***lambda* Cyhalothrin**	2	107.0	12.7		2	103.5	2.1
Carbamate Pesticides by LCMS							
Aldicarb	8	89.7	6.7		13	91.7	7.7
Captan	9	84.8	10.7				
Carbaryl	8	103.1	9.1		14	100.2	12.2
Carbofuran	8	90.4	8.7		14	94.7	9.3
Diuron**	8	93.9	8.1		14	90.7	6.5

Mean percent recoveries and standard deviation of percent recoveries for pesticide quality assurance Lab Control Spikes and Matrix Spikes, continued.

Linuron**	7	86.8	3.0		13	86.5	8.8
Methiocarb	8	99.5	9.9		14	89.5	9.8
Methomyl	8	87.3	6.8		14	92.1	7.1
Herbicides by GC/TSD							
Atrazine	9	89.0	8.5		13	102.5	11.1
Cyanazine	9	81.9	4.6		11	90.8	11.4
Molinate	9	91.8	9.7		13	92.4	9.4
Simazine	7	87.3	11.6		13	96.3	8.6
Thiobencarb	9	100.2	7.5		13	99.8	11.1

* All samples used to calculate Mean and Standard deviation showed values that met the SWAMP Database Qualifier. Samples that ranged outside those qualifiers are not reflected in this table.

** Diuron and Linuron are Herbicides but listed under Carbamates due to the same analytical method, and were extracted from the Carbamate Matrix Spike QA / QC sample

Summary of Pesticide Field QA / QC data for the Irrigation Season 2004 (in µg/L).
Organochlorine Pesticides

	Site ID	Collection Date	Collection Time	DDD(o,p')	DDD(p,p')	DDE(o,p')	DDE(p,p')	DDT(o,p')	DDT(p,p')	Dicofol	Dieldrin	Endrin	Methoxychlor
Field Duplicates													
Concentration in ppb (µg/L)	SS03	07/08/04	13:40	ND	ND	ND	**0.007**	ND	ND	ND	**0.005**	ND	ND
Concentration in ppb (µg/L)	SS03	07/08/04	13:41	ND	ND	ND	**0.008**	ND	ND	ND	**0.006**	ND	ND
RPD							13				18		
Concentration in ppb (µg/L)	NSJ06	07/14/04	8:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ06	07/14/04	8:53	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPD													
Concentration in ppb (µg/L)	NSJ28	07/28/04	10:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ28	07/28/04	10:33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPD													
Concentration in ppb (µg/L)	SSJ12	08/04/04	10:20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	SSJ12	08/04/04	10:23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPD													
Concentration in ppb (µg/L)	CS03	08/09/04	9:40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS03	08/09/04	9:43	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPD													
Concentration in ppb (µg/L)	CS13	08/19/04	9:40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS13	08/19/04	9:43	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPD													
Concentration in ppb (µg/L)	NSJ03	09/08/04	8:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ03	09/08/04	8:33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPD													
Field Blanks													
Concentration in ppb (µg/L)	CS09	07/27/04	12:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS09	07/27/04	12:51	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ28	08/11/04	10:00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ28	08/11/04	10:01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	D02	08/17/04	11:00	ND	ND	ND	**0.006**	ND	ND	ND	**0.008**	ND	ND
Concentration in ppb (µg/L)	D02	08/17/04	11:01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NS07	08/30/04	10:20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NS07	08/30/04	10:21	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	SSJ08	09/09/04	10:20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	SSJ08	09/09/04	10:21	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ26	09/15/05	11:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ26	09/15/05	11:51	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Summary of Pesticide Field QA / QC data for the Irrigation Season 2004 (in µg/L).
Organophosphate Pesticides

	Site ID	Collection Date	Collection Time	Azinphos methyl	Chlorpyrifos	Diazinon	Dimethoate	Disulfoton	Malathion	Methidathion	Parathion, Methyl	Phorate	Phosmet	Parathion, Ethyl [a]
Field Duplicates														
Concentration in ppb (µg/L)	NSJ26	07/20/04	12:00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ26	07/20/04	12:03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPD														
Concentration in ppb (µg/L)	SSJ08	07/29/04	9:50	ND	0.023	<RL	<RL	<RL	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	SSJ08	07/29/04	9:53	ND	0.024	<RL	0.076	<RL	ND	ND	<RL	ND	ND	ND
RPD					4		na							
Concentration in ppb (µg/L)	SS07	08/05/04	12:10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	SS07	08/05/04	12:13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPD														
Concentration in ppb (µg/L)	FT13	08/16/04	7:20	ND	0.013	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	FT13	08/16/04	7:23	ND	0.016	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPD					21									
Concentration in ppb (µg/L)	CS10	08/24/04	11:20	ND	0.038	0.009	ND	<RL	<RL	ND	<RL	ND	ND	ND
Concentration in ppb (µg/L)	CS10	08/24/04	11:23	ND	0.036	0.008	ND	<RL	<RL	ND	<RL	ND	ND	ND
RPD					5	12								
Concentration in ppb (µg/L)	CS09	09/07/04	10:20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS09	09/07/04	10:23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPD														
Concentration in ppb (µg/L)	NSJ28	09/08/04	9:30	ND	0.050	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ28	09/08/04	9:33	ND	0.050	ND	ND	ND	ND	ND	ND	ND	ND	ND
RPD					0									
Field Blanks														
Concentration in ppb (µg/L)	CS13	07/08/04	9:00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS13	07/08/04	9:01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS12	07/26/04	10:30	ND	0.009	0.009	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS12	07/26/04	10:31	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS21	08/10/04	9:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS21	08/10/04	9:51	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ18	08/12/04	9:40	ND	0.280	0.020	<RL	ND	ND	ND	<RL	<RL	ND	ND
Concentration in ppb (µg/L)	NSJ18	08/12/04	9:41	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ29	08/26/04	11:50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ29	08/26/04	11:51	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NS07	09/16/04	11:40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NS07	09/16/04	11:41	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Summary of Pesticide Field QA / QC data for the Irrigation Season 2004 (in µg/L).
Pyrithroids

	Site ID	Collection Date	Collection Time	Bifenthrin	Cyfluthrin	Cypermethrin	Esfenvalerate/Fenvalerate	Permethrin	*lambda* Cyhalothrin *
Field Duplicates									
Concentration in ppb (µg/L)	**SS07**	**07/08/04**	**11:30**	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	**SS07**	**07/08/04**	**11:33**	ND	ND	ND	ND	ND	ND
RPD									
Concentration in ppb (µg/L)	**FT14**	**07/20/04**	**11:30**	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	**FT14**	**07/20/04**	**11:33**	ND	ND	ND	ND	ND	ND
RPD									
Concentration in ppb (µg/L)	**NSJ06**	**07/28/04**	**9:30**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**NSJ06**	**07/28/04**	**9:33**	ND	ND	ND	ND	ND	
RPD									
Concentration in ppb (µg/L)	**CS03**	**08/09/04**	**9:40**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**CS03**	**08/09/04**	**9:43**	ND	ND	ND	ND	ND	
RPD									
Concentration in ppb (µg/L)	**CS21**	**08/24/04**	**8:50**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**CS21**	**08/24/04**	**8:53**	ND	ND	ND	ND	ND	
RPD									
Concentration in ppb (µg/L)	**CS10**	**09/07/04**	**11:40**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**CS10**	**09/07/04**	**11:43**	ND	ND	ND	ND	ND	
RPD									
Field Blanks									
Concentration in ppb (µg/L)	**NSJ03**	**07/14/04**	**12:10**	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	**NSJ03**	**07/14/04**	**12:11**	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	**CS21**	**07/27/04**	**10:00**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**CS21**	**07/27/04**	**10:01**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**SSJ08**	**08/12/04**	**14:30**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**SSJ08**	**08/12/04**	**14:31**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**NSJ28**	**08/25/04**	**9:30**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**NSJ28**	**08/25/04**	**9:31**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**NSJ24**	**09/01/04**	**13:00**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**NSJ24**	**09/01/04**	**13:01**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**D03**	**09/14/04**	**12:50**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**D03**	**09/14/04**	**12:51**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**NS04**	**09/16/04**	**9:50**	ND	ND	ND	ND	ND	
Concentration in ppb (µg/L)	**NS04**	**09/16/04**	**9:51**	ND	ND	ND	ND	ND	

Summary of Pesticide Field QA / QC data for the Irrigation Season 2004 (in µg/L).

Carbamates

	Site ID	Collection Date	Collection Time	Aldicarb	Captan	Carbaryl	Carbofuran	Diuron*	Linuron*	Methiocarb	Methomyl
Field Duplicates											
Concentration in ppb (µg/L)	CS10	07/13/04	11:20	ND		ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS10	07/13/04	11:23	ND		ND	ND	ND	ND	ND	ND
RPD											
Concentration in ppb (µg/L)	NSJ26	07/20/04	12:00	ND		ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ26	07/20/04	12:03	ND		ND	ND	ND	ND	ND	ND
RPD											
Concentration in ppb (µg/L)	NSJ03	07/28/04	13:30	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ03	07/28/04	13:33	ND	ND	ND	ND	ND	ND	ND	ND
RPD											
Concentration in ppb (µg/L)	SS07	08/05/04	12:10	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	SS07	08/05/04	12:13	ND	ND	ND	ND	ND	ND	ND	ND
RPD											
Concentration in ppb (µg/L)	CS03	08/23/04	9:00	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS03	08/23/04	9:03	ND	ND	ND	ND	ND	ND	ND	ND
RPD											
Concentration in ppb (µg/L)	SSJ08	08/26/04	10:40	ND	ND	ND	ND	**0.100**	ND	ND	**2.25**
Concentration in ppb (µg/L)	SSJ08	08/26/04	10:43	ND	ND	ND	ND	**0.110**	ND	ND	**2.34**
RPD								10			4
Concentration in ppb (µg/L)	SS03	09/02/04	11:30	ND	ND	ND	**<RL**	ND	ND	ND	ND
Concentration in ppb (µg/L)	SS03	09/02/04	11:33	ND	ND	ND	**<RL**	ND	ND	ND	ND
RPD											
Field Blanks											
Concentration in ppb (µg/L)	SSJ01	07/22/04	12:00	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	SSJ01	07/22/04	12:01	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	FT13	08/02/04	8:00	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	FT13	08/02/04	8:01	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ18	08/12/04	9:40	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ18	08/12/04	9:41	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	SSJ08	08/12/04	14:30	ND	ND	ND	ND	**0.120**	ND	ND	**0.550**
Concentration in ppb (µg/L)	SSJ08	08/12/04	14:31	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ06	08/25/04	10:50	ND	ND	ND	ND	**0.030**	ND	ND	ND
Concentration in ppb (µg/L)	NSJ06	08/25/04	10:51	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ24	09/15/05	13:00	ND	ND	ND	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ24	09/15/05	13:01	ND	ND	ND	ND	ND	ND	ND	ND

*** Diuron and Linuron are Herbicides but listed under Carbamates due to the same analytical method, and were extracted from the Carbamate field QA / QC sample**

Summary of Pesticide Field QA / QC data for the Irrigation Season 2004 (in µg/L).

Herbicides

	Site ID	Collection Date	Collection Time	Atrazine	Cyanazine	Molinate	Simazine	Thiobencarb
Field Duplicates								
Concentration in ppb (µg/L)	CS21	07/13/04	9:10	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS21	07/13/04	9:13	ND	ND	ND	ND	ND
RPD								
Concentration in ppb (µg/L)	NSJ29	07/15/04	12:10	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ29	07/15/04	12:13	ND	ND	ND	ND	ND
RPD								
Concentration in ppb (µg/L)	NSJ18	07/29/04	15:00	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ18	07/29/04	15:03	ND	ND	ND	ND	ND
RPD								
Concentration in ppb (µg/L)	CS10	08/10/04	13:00	ND	ND	ND	ND	<RL
Concentration in ppb (µg/L)	CS10	08/10/04	13:03	ND	ND	ND	ND	<RL
RPD								
Concentration in ppb (µg/L)	FT15	08/16/04	10:40	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	FT15	08/16/04	10:43	ND	ND	ND	ND	ND
RPD								
Concentration in ppb (µg/L)	NSJ24	09/15/05	13:00	ND	ND	ND	ND	<RL
Concentration in ppb (µg/L)	NSJ24	09/15/05	13:03	ND	ND	ND	ND	<RL
RPD								
Field Blanks								
Concentration in ppb (µg/L)	D02	07/21/04	9:40	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	D02	07/21/04	9:41	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	FT05	07/22/04	7:30	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	FT05	07/22/04	7:31	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ06	07/28/04	9:30	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ06	07/28/04	9:31	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ26	08/04/04	12:40	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ26	08/04/04	12:41	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ24	08/18/04	12:40	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	NSJ24	08/18/04	12:41	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS13	09/02/04	8:20	ND	ND	ND	ND	ND
Concentration in ppb (µg/L)	CS13	09/02/04	8:21	<RL	ND	ND	ND	ND
Concentration in ppb (µg/L)	SS07	09/02/04	10:20	<RL	ND	ND	ND	ND
Concentration in ppb (µg/L)	SS07	09/02/04	10:21	<RL	ND	ND	ND	ND

Summary of TOC Field QA / QC data for the Irrigation Season 2004

	Site ID	Collection Date	Collection Time	TOC in mg/L
Field Duplicates				
Concentration in (mg/L)	*CS15*	*07/12/04*	*13:50*	*ND*
Concentration in (mg/L)	*CS15*	*07/12/04*	*13:53*	*ND*
RPD				*ND*
Concentration in (mg/L)	SS04	07/27/04	1510	19.31
Concentration in (mg/L)	SS04	07/27/04	1513	21.54
RPD				11
Concentration in (mg/L)	FT15	08/16/04	1040	9.39
Concentration in (mg/L)	FT15	08/16/04	1043	11.94
RPD				24
Concentration in (mg/L)	D03	08/17/04	1220	23.51
Concentration in (mg/L)	D03	08/17/04	1223	25.35
RPD				8
Concentration in (mg/L)	NSJ24	09/01/04	1300	5.58
Concentration in (mg/L)	NSJ24	09/01/04	1303	5.17
RPD				8
Concentration in (mg/L)	NSJ03	09/08/04	830	5.00
Concentration in (mg/L)	NSJ03	09/08/04	833	5.14
RPD				3
Field Blanks				
Concentration in (mg/L)	*D03*	*07/21/04*	*10:50*	*11*
Concentration in (mg/L)	*D03*	*07/21/04*	*10:51*	*ND*
Concentration in (mg/L)	*SSJ01*	*07/22/04*	*12:00*	*3.4*
Concentration in (mg/L)	*SSJ01*	*07/22/04*	*12:01*	*ND*
Concentration in (mg/L)	NSJ28	08/11/04	1000	6.19
Concentration in (mg/L)	NSJ28	08/11/04	1001	ND (1.788)
Concentration in (mg/L)	CS09	08/24/04	1010	12.62
Concentration in (mg/L)	CS09	08/24/04	1011	ND (0.676)
Concentration in (mg/L)	NS04	08/30/04	900	18.68
Concentration in (mg/L)	NS04	08/30/04	901	ND (1.644)
Concentration in (mg/L)	NSJ18	09/09/04	1240	2.51
Concentration in (mg/L)	NSJ18	09/09/04	1241	-0.30

cursive values show data analyzed at DF&G lab
other values show data analyzed at UC Davis Department of Civil and Environmental Engineering / detection limit = 2.4mg/L

Summary of Nutrients, Physical Parameter and Hardness Field QA / QC data for the Irrigation Season 2004

Site ID	Collection Date	Collection Time		Constituent	Concentration in mg/L	Relative percent difference
Field Duplicates						
CS13	07/08/04	9:00	**Physical Parameters**	**Color**	14.1	15
CS13	07/08/04	9:03	**Physical Parameters**	**Color**	12.1	
CS13	07/08/04	9:00	**Physical Parameters**	**TDS in mg/L**	280	1
CS13	07/08/04	9:03	**Physical Parameters**	**TDS in mg/L**	278	
CS13	07/08/04	9:00	**Physical Parameters**	**Turbidity**	9.6	1
CS13	07/08/04	9:03	**Physical Parameters**	**Turbidity**	9.7	
CS03	07/12/04	9:50	**Hardness**	**$CaCO_3$**	128	0
CS03	07/12/04	9:53	**Hardness**	**$CaCO_3$**	128	
CS21	07/13/04	9:10	**Nutrients**	**Ammonia**	ND	ND
CS21	07/13/04	9:13	**Nutrients**	**Ammonia**	ND	
CS21	07/13/04	9:10	**Nutrients**	**Nitrite / Nitrate**	0.0073 DNQ	DNQ
CS21	07/13/04	9:13	**Nutrients**	**Nitrite / Nitrate**	0.0070 DNQ	
CS21	07/13/04	9:10	**Nutrients**	**Nitrite**	ND	ND
CS21	07/13/04	9:13	**Nutrients**	**Nitrite**	ND	
CS21	07/13/04	9:10	**Nutrients**	**OrthoPhosphate**	0.0139	1
CS21	07/13/04	9:13	**Nutrients**	**OrthoPhosphate**	0.0141	
SSJ12	07/20/04	10:00	**Hardness**	**$CaCO_3$**	14.3	7
SSJ12	07/20/04	10:03	**Hardness**	**$CaCO_3$**	15.3	
FT14	07/20/04	11:10	**Nutrients**	**Ammonia**	ND	ND
FT14	07/20/04	11:13	**Nutrients**	**Ammonia**	ND	
FT14	07/20/04	11:10	**Nutrients**	**Nitrite / Nitrate**	ND	ND
FT14	07/20/04	11:13	**Nutrients**	**Nitrite / Nitrate**	ND	
FT14	07/20/04	11:10	**Nutrients**	**Nitrite**	ND	ND
FT14	07/20/04	11:13	**Nutrients**	**Nitrite**	ND	
FT14	07/20/04	11:10	**Nutrients**	**OrthoPhosphate**	0.0217	1
FT14	07/20/04	11:13	**Nutrients**	**OrthoPhosphate**	0.0214	
FT14	07/20/04	11:00	**Physical Parameters**	**Color**	10.7	13
FT14	07/20/04	11:03	**Physical Parameters**	**Color**	9.4	
FT14	07/20/04	11:00	**Physical Parameters**	**TDS in mg/L**	99	5
FT14	07/20/04	11:03	**Physical Parameters**	**TDS in mg/L**	94	
FT14	07/20/04	11:00	**Physical Parameters**	**Turbidity**	8.8	***31***
FT14	07/20/04	11:03	**Physical Parameters**	**Turbidity**	12	
CS13	07/22/04	8:30	**Hardness**	**$CaCO_3$**	173	2
CS13	07/22/04	8:33	**Hardness**	**$CaCO_3$**	177	
CS10	07/27/04	14:20	**Physical Parameters**	**Color**	14	4
CS10	07/27/04	14:23	**Physical Parameters**	**Color**	14.5	
CS10	07/27/04	14:20	**Physical Parameters**	**TDS in mg/L**	103	1
CS10	07/27/04	14:23	**Physical Parameters**	**TDS in mg/L**	104	
CS10	07/27/04	14:20	**Physical Parameters**	**Turbidity**	24	***46***
CS10	07/27/04	14:23	**Physical Parameters**	**Turbidity**	15	
FT15	08/02/04	11:00	**Physical Parameters**	**Color**	2.6 DNQ	DNQ
FT15	08/02/04	11:03	**Physical Parameters**	**Color**	ND	
FT15	08/02/04	11:00	**Physical Parameters**	**TDS in mg/L**	270	1
FT15	08/02/04	11:03	**Physical Parameters**	**TDS in mg/L**	266	
FT15	08/02/04	11:00	**Physical Parameters**	**Turbidity**	32	10
FT15	08/02/04	11:03	**Physical Parameters**	**Turbidity**	29	
D02	08/03/04	10:30	**Nutrients**	**Ammonia**	0.351	7
D02	08/03/04	10:33	**Nutrients**	**Ammonia**	0.375	
D02	08/03/04	10:30	**Nutrients**	**Nitrite / Nitrate**	2.19	0
D02	08/03/04	10:33	**Nutrients**	**Nitrite / Nitrate**	2.18	
D02	08/03/04	10:30	**Nutrients**	**Nitrite**	0.101	1
D02	08/03/04	10:33	**Nutrients**	**Nitrite**	0.100	
D02	08/03/04	10:30	**Nutrients**	**OrthoPhosphate**	0.374	1
D02	08/03/04	10:33	**Nutrients**	**OrthoPhosphate**	0.372	

Summary of Nutrients, Physical Parameter and Hardness Field QA / QC data for the Irrigation Season 2004, continued

SS07	08/05/04	12:10	**Physical Parameters**	**Color**	9.4	8
SS07	08/05/04	12:13	**Physical Parameters**	**Color**	8.7	
SS07	08/05/04	12:10	**Physical Parameters**	**TDS in mg/L**	192	2
SS07	08/05/04	12:13	**Physical Parameters**	**TDS in mg/L**	196	
SS07	08/05/04	12:10	**Physical Parameters**	**Turbidity**	4.2	0
SS07	08/05/04	12:13	**Physical Parameters**	**Turbidity**	4.2	
SS04	08/10/04	14:03	**Hardness**	**$CaCO_3$**	124	0
SS04	08/10/04	14:00	**Hardness**	**$CaCO_3$**	124	
NSJ28	08/11/04	10:00	**Nutrients**	**Ammonia**	0.124	1
NSJ28	08/11/04	10:03	**Nutrients**	**Ammonia**	0.123	
NSJ28	08/11/04	10:00	**Nutrients**	**Nitrite / Nitrate**	0.655	5
NSJ28	08/11/04	10:03	**Nutrients**	**Nitrite / Nitrate**	0.623	
NSJ28	08/11/04	10:00	**Nutrients**	**Nitrite**	0.0075 DNQ	DNQ
NSJ28	08/11/04	10:03	**Nutrients**	**Nitrite**	0.0078 DNQ	
NSJ28	08/11/04	10:00	**Nutrients**	**OrthoPhosphate**	0.0724	0
NSJ28	08/11/04	10:03	**Nutrients**	**OrthoPhosphate**	0.0724	
FT13	08/16/04	7:20	**Hardness**	**$CaCO_3$**	102	4
FT13	08/16/04	7:23	**Hardness**	**$CaCO_3$**	97.9	
NSJ03	08/25/04	8:20	**Physical Parameters**	**Color**	28	8
NSJ03	08/25/04	8:23	**Physical Parameters**	**Color**	30	
NSJ03	08/25/04	8:20	**Physical Parameters**	**TDS in mg/L**	484	3
NSJ03	08/25/04	8:23	**Physical Parameters**	**TDS in mg/L**	472	
NSJ03	08/25/04	8:20	**Physical Parameters**	**Turbidity**	4.4	2
NSJ03	08/25/04	8:23	**Physical Parameters**	**Turbidity**	4.3	
SSJ08	08/26/04	10:40	**Nutrients**	**Ammonia**	0.113	3
SSJ08	08/26/04	10:43	**Nutrients**	**Ammonia**	0.116	
SSJ08	08/26/04	10:40	**Nutrients**	**Nitrite / Nitrate**	0.844	1
SSJ08	08/26/04	10:43	**Nutrients**	**Nitrite / Nitrate**	0.836	
SSJ08	08/26/04	10:40	**Nutrients**	**Nitrite**	0.0527	0
SSJ08	08/26/04	10:43	**Nutrients**	**Nitrite**	0.0528	
SSJ08	08/26/04	10:40	**Nutrients**	**OrthoPhosphate**	0.272	0
SSJ08	08/26/04	10:43	**Nutrients**	**OrthoPhosphate**	0.272	
SS03	09/02/04	11:30	**Physical Parameters**	**Color**	25	0
SS03	09/02/04	11:33	**Physical Parameters**	**Color**	25	
SS03	09/02/04	11:30	**Physical Parameters**	**TDS in mg/L**	347	1
SS03	09/02/04	11:33	**Physical Parameters**	**TDS in mg/L**	344	
SS03	09/02/04	11:30	**Physical Parameters**	**Turbidity**	50	0
SS03	09/02/04	11:33	**Physical Parameters**	**Turbidity**	50	
NSJ06	09/08/04	10:40	**Nutrients**	**Ammonia**	ND	ND
NSJ06	09/08/04	10:43	**Nutrients**	**Ammonia**	ND	
NSJ06	09/08/04	10:40	**Nutrients**	**Nitrite / Nitrate**	ND	ND
NSJ06	09/08/04	10:43	**Nutrients**	**Nitrite / Nitrate**	ND	
NSJ06	09/08/04	10:40	**Nutrients**	**Nitrite**	ND	ND
NSJ06	09/08/04	10:43	**Nutrients**	**Nitrite**	ND	
NSJ06	09/08/04	10:40	**Nutrients**	**OrthoPhosphate**	0.0074 DNQ	DNQ
NSJ06	09/08/04	10:43	**Nutrients**	**OrthoPhosphate**	0.0076 DNQ	
NSJ18	09/09/04	12:40	**Hardness**	**CaCO3**	347	5
NSJ18	09/09/04	12:43	**Hardness**	**CaCO3**	364	

Field Blanks

CS03	07/12/04	9:50	**Nutrients**	**Ammonia**	ND
CS03	07/12/04	9:51	**Nutrients**	**Ammonia**	ND
CS03	07/12/04	9:50	**Nutrients**	**Nitrite / Nitrate**	ND
CS03	07/12/04	9:51	**Nutrients**	**Nitrite / Nitrate**	ND
CS03	07/12/04	9:50	**Nutrients**	**Nitrite**	ND
CS03	07/12/04	9:51	**Nutrients**	**Nitrite**	ND
CS03	07/12/04	9:50	**Nutrients**	**OrthoPhosphate**	0.0115
CS03	07/12/04	9:51	**Nutrients**	**OrthoPhosphate**	ND

Summary of Nutrients, Physical Parameter and Hardness Field QA / QC data for the Irrigation Season 2004, continued

NSJ03	07/14/04	12:10	**Physical Parameters**	**Color**	35.3
NSJ03	07/14/04	12:11	**Physical Parameters**	**Color**	ND
NSJ03	07/14/04	12:10	**Physical Parameters**	**TDS in mg/L**	372
NSJ03	07/14/04	12:11	**Physical Parameters**	**TDS in mg/L**	ND
NSJ03	07/14/04	12:10	**Physical Parameters**	**Turbidity**	8.2
NSJ03	07/14/04	12:11	**Physical Parameters**	**Turbidity**	ND
D03	07/21/04	10:50	**Nutrients**	**Ammonia**	0.553
D03	07/21/04	10:51	**Nutrients**	**Ammonia**	ND
D03	07/21/04	10:50	**Nutrients**	**Ammonia**	NA
D03	07/21/04	10:51	**Nutrients**	**Ammonia**	ND
D03	07/21/04	10:50	**Nutrients**	**Nitrite / Nitrate**	0.333
D03	07/21/04	10:51	**Nutrients**	**Nitrite / Nitrate**	ND
D03	07/21/04	10:50	**Nutrients**	**Nitrite**	0.04
D03	07/21/04	10:51	**Nutrients**	**Nitrite**	ND
D03	07/21/04	10:50	**Nutrients**	**OrthoPhosphate**	0.44
D03	07/21/04	10:51	**Nutrients**	**OrthoPhosphate**	ND
CS12	07/26/04	10:30	**Nutrients**	**Ammonia**	ND
CS12	07/26/04	10:31	**Nutrients**	**Ammonia**	ND
CS12	07/26/04	10:30	**Nutrients**	**Nitrite / Nitrate**	0.0116
CS12	07/26/04	10:31	**Nutrients**	**Nitrite / Nitrate**	ND
CS12	07/26/04	10:30	**Nutrients**	**Nitrite**	ND
CS12	07/26/04	10:31	**Nutrients**	**Nitrite**	ND
CS12	07/26/04	10:30	**Nutrients**	**OrthoPhosphate**	0.288
CS12	07/26/04	10:31	**Nutrients**	**OrthoPhosphate**	ND
FT08	08/03/04	8:40	**Nutrients**	**Ammonia**	0.047 DNQ
FT08	08/03/04	8:41	**Nutrients**	**Ammonia**	***0.040 DNQ***
FT08	08/03/04	8:40	**Nutrients**	**Nitrite / Nitrate**	0.0150
FT08	08/03/04	8:41	**Nutrients**	**Nitrite / Nitrate**	ND
FT08	08/03/04	8:40	**Nutrients**	**Nitrite**	ND
FT08	08/03/04	8:41	**Nutrients**	**Nitrite**	ND
FT08	08/03/04	8:40	**Nutrients**	**OrthoPhosphate**	ND
FT08	08/03/04	8:41	**Nutrients**	**OrthoPhosphate**	ND
D01	08/03/04	9:00	**Physical Parameters**	**Color**	30.2
D01	08/03/04	9:01	**Physical Parameters**	**Color**	ND
D01	08/03/04	9:00	**Physical Parameters**	**TDS in mg/L**	498
D01	08/03/04	9:01	**Physical Parameters**	**TDS in mg/L**	ND
D01	08/03/04	9:00	**Physical Parameters**	**Turbidity**	4.5
D01	08/03/04	9:01	**Physical Parameters**	**Turbidity**	ND
SS07	08/05/04	12:10	**Nutrients**	**Ammonia**	ND
SS07	08/05/04	12:11	**Nutrients**	**Ammonia**	***0.082 DNQ***
SS07	08/05/04	12:10	**Nutrients**	**Nitrite / Nitrate**	0.18
SS07	08/05/04	12:11	**Nutrients**	**Nitrite / Nitrate**	ND
SS07	08/05/04	12:10	**Nutrients**	**Nitrite**	0.0132
SS07	08/05/04	12:11	**Nutrients**	**Nitrite**	ND
SS07	08/05/04	12:10	**Nutrients**	**OrthoPhosphate**	0.044
SS07	08/05/04	12:11	**Nutrients**	**OrthoPhosphate**	ND
CS12	08/09/04	11:30	**Physical Parameters**	**Color**	64.2
CS12	08/09/04	11:31	**Physical Parameters**	**Color**	ND
CS12	08/09/04	11:30	**Physical Parameters**	**TDS in mg/L**	152
CS12	08/09/04	11:31	**Physical Parameters**	**TDS in mg/L**	ND
CS12	08/09/04	11:30	**Physical Parameters**	**Turbidity**	2
CS12	08/09/04	11:31	**Physical Parameters**	**Turbidity**	ND
NSJ28	08/11/04	10:00	**Physical Parameters**	**Color**	13.5
NSJ28	08/11/04	10:01	**Physical Parameters**	**Color**	ND
NSJ28	08/11/04	10:00	**Physical Parameters**	**TDS in mg/L**	50
NSJ28	08/11/04	10:01	**Physical Parameters**	**TDS in mg/L**	ND
NSJ28	08/11/04	10:00	**Physical Parameters**	**Turbidity**	13
NSJ28	08/11/04	10:01	**Physical Parameters**	**Turbidity**	***0.05***

Summary of Nutrients, Physical Parameter and Hardness Field QA / QC data for the Irrigation Season 2004, continued

NS04	08/12/04	9:30	**Physical Parameters**	**Color**	69.0
NS04	08/12/04	9:31	**Physical Parameters**	**Color**	ND
NS04	08/12/04	9:30	**Physical Parameters**	**TDS in mg/L**	199
NS04	08/12/04	9:31	**Physical Parameters**	**TDS in mg/L**	ND
NS04	08/12/04	9:30	**Physical Parameters**	**Turbidity**	0.65
NS04	08/12/04	9:31	**Physical Parameters**	**Turbidity**	ND
FT15	08/16/04	10:40	**Nutrients**	**Ammonia**	ND
FT15	08/16/04	10:41	**Nutrients**	**Ammonia**	ND
FT15	08/16/04	10:40	**Nutrients**	**Nitrite / Nitrate**	2.81
FT15	08/16/04	10:41	**Nutrients**	**Nitrite / Nitrate**	ND
FT15	08/16/04	10:40	**Nutrients**	**Nitrite**	0.0348
FT15	08/16/04	10:41	**Nutrients**	**Nitrite**	ND
FT15	08/16/04	10:40	**Nutrients**	**OrthoPhosphate**	0.0085 DNQ
FT15	08/16/04	10:41	**Nutrients**	**OrthoPhosphate**	ND
D03	09/14/04	12:50	**Physical Parameters**	**Color**	48
D03	09/14/04	12:51	**Physical Parameters**	**Color**	ND
D03	09/14/04	12:50	**Physical Parameters**	**TDS in mg/L**	663
D03	09/14/04	12:51	**Physical Parameters**	**TDS in mg/L**	ND
D03	09/14/04	12:50	**Physical Parameters**	**Turbidity**	29
D03	09/14/04	12:51	**Physical Parameters**	**Turbidity**	***0.10***
SSJ12	09/15/04	9:50	**Nutrients**	**Ammonia**	ND
SSJ12	09/15/04	9:51	**Nutrients**	**Ammonia**	ND
SSJ12	09/15/04	9:50	**Nutrients**	**Nitrite / Nitrate**	0.0071 DNQ
SSJ12	09/15/04	9:51	**Nutrients**	**Nitrite / Nitrate**	ND
SSJ12	09/15/04	9:50	**Nutrients**	**Nitrite**	ND
SSJ12	09/15/04	9:51	**Nutrients**	**Nitrite**	ND
SSJ12	09/15/04	9:50	**Nutrients**	**OrthoPhosphate**	0.0281
SSJ12	09/15/04	9:51	**Nutrients**	**OrthoPhosphate**	ND

Summary of THM Field QA / QC data for the Irrigation Season 2004

	Sample ID	Collection Date	Collection Time	Chloroform in ug/L	Bromodichlorom ethane in µg/L	Dibromochlorom ethane in µg/L	Bromoform in µg/L
Field Duplicates							
Concentration in ppb (µg/L)	SS03	7/22/2004	14:30	-0.0476	0	0	0
Concentration in ppb (µg/L)	SS03	7/22/2004	14:33	-0.0388	0	0	0
RPD							
Concentration in ppb (µg/L)	SSJ01	8/3/2004	11:30	0	0	0	0
Concentration in ppb (µg/L)	SSJ01	8/3/2004	11:33	-1.48	0.00	0.00	0.00
RPD							
Concentration in ppb (µg/L)	NSJ18	8/12/2004	9:40	0.000	0.000	0.000	0.000
Concentration in ppb (µg/L)	NSJ18	8/12/2004	9:43	0.000	0.000	0.000	0.000
RPD							

Field Blanks	Sample ID	Collection Date	Collection Time	Chloroform	Bromodichlorom ethane	Dibromochlorom ethane	Bromoform
Concentration in ppb (µg/L)	CS13	7/8/2004	9:20	-0.06	0	0	0
Concentration in ppb (µg/L)	CS13	7/8/2004	9:21	-0.0272	0	0	0
Concentration in ppb (µg/L)	DO01	7/21/2004	8:40	-0.0964	0	0	0
Concentration in ppb (µg/L)	DO01	7/21/2004	8:41	-0.0348	0	0	0
Concentration in ppb (µg/L)	NSJ28	7/28/2004	10:30	-0.0468	0	0	0
Concentration in ppb (µg/L)	NSJ28	7/28/2004	10:31	-0.0444	0	0	0
Concentration in ppb (µg/L)	CS15	8/9/2004	13:50	0.000	0	0	0
Concentration in ppb (µg/L)	CS15	8/9/2004	13:51	0.0064	0	0	0

Summary of Hardness Field QA / QC data for the Irrigation Season 2004

	Sample ID	Collection Date	Collection Time	Hardness in mg/L
Field Duplicates				
Concentration in ppb (µg/L)	CS03	7/12/2004	9:50	128
Concentration in ppb (µg/L)	CS03	7/12/2004	9:53	128
RPD				0
Concentration in ppb (µg/L)	SSJ12	20/Jul/2004	10:00	14.3
Concentration in ppb (µg/L)	SSJ12	20/Jul/2004	10:03	15.3
RPD				7
Concentration in ppb (µg/L)	CS13	22/Jul/2004	8:30	173
Concentration in ppb (µg/L)	CS13	22/Jul/2004	8:33	177
RPD				2
Concentration in ppb (µg/L)	SS04	10/Aug/2004	14:03	124
Concentration in ppb (µg/L)	SS04	10/Aug/2004	14:00	124
RPD				0
Concentration in ppb (µg/L)	FT13	16/Aug/2004	7:20	102
Concentration in ppb (µg/L)	FT13	16/Aug/2004	7:23	97.9
RPD				4
Concentration in ppb (µg/L)	NSJ18	09/Sep/2004	12:40	347
Concentration in ppb (µg/L)	NSJ18	09/Sep/2004	12:43	364
RPD				5

APPENDIX II. RESULTS OF SEDIMENT TOXICITY AND SEDIMENT CHEMISTRY ANALYSES

CHEMICAL ANALYSES

Eighteen of the 28 analytes were not detected or were barely detectable (~1 ng/g) in any of the 33 samples analyzed. These analytes were alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, aldrin, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, endosulfan I, endosulfan II, endosulfan sulfate, methoxychlor, endrin aldehyde, endrin ketone, deltamethrin, cyfluthrin, and cypermethrin.

Chlorpyrifos was the only organophosphate analyzed for in sediments because it is considerably more hydrophobic than diazinon. It was detected in 17 of 33 sites. Maximum concentration (39.7 ng/g) was seen in Button Ditch on Ave. 368 in Tulare County (FT05), followed by 13.4 ng/g at Hospital Creek at Rt. 33 (SED12). There is no information in the literature to indicate the concentration of sediment-associated chlorpyrifos that is toxic to benthic invertebrates, though survival of *Hyalella azteca* was good (94%) in the sample containing 39.7 ng/g.

Among the organochlorines, DDT and DDE reached maxima at Hospital Creek at River Road (28.5 and 56.4 ng/g), dieldrin reached a maximum of 3.9 ng/g, and endrin reached a maximum of 2.5 ng/g. All these concentrations are at least two orders of magnitude below acutely toxic levels (Weston et al., 2004) to the two species typically used for sediment toxicity testing *H. azteca* or *Chironomus tentans*.

Among the pyrethroids, permethrin was detected at 24% of the sites, with a maximum concentration of 3.7 ng/g. For comparison, in sediment containing 1 % organic carbon the LC50 of permethrin to H. azteca would be about 49 ng/g (Amweg, et al., in press), far above the maximum concentration observed. Lambda-cyhalothrin was detected at 15% of the sites, with a maximum of 6.1 ng/g in Orestimba Creek at Kilburn Rd. (compared to a toxic concentration as noted above of 4.5 ng/g). Esfenvalerate was detected at 12% of the sites, with a maximum of 43.8 ng/g in an unnamed ditch along Bonetti Drive in San Joaquin County (SED11) (compared to a toxic concentration of 8.9 ng/g). Bifenthrin was detected at 9% of the sites and reached a maximum of 41 ng/g at Hospital Creek at River Road (SED12) (compared to a toxic concentration of 1.8 ng/g).

TOXICITY TESTING

All samples were tested using the amphipod, *Hyalella azteca*, in a 10-d exposure, following standardized EPA protocols (U.S. EPA, 2000). At the completion of the test, survival and growth were determined. The vast majority of samples showed no significant mortality or reduction in growth (Table 1).

Table 1. Samples with no apparent toxicity

Site	Survival (%)	Weight at end (as % of control)	Site	Survival (%)	Weight at end (as % of control)
NS07	94.3±5.3	126	SED9	96.3±5.2	128
CS03	91.3±11.3	140	SSJ01	92.5±7.1	154
CS09	92.9±9.5	99	SSJ08	96.3±5.2	123
CS10	85.0±10.7	100	SSJ12	95.7±5.3	126
CS12	84.3±17.2	115	FT05	93.8±5.2	119
CS13	88.8±12.5	100	FT08	97.5±4.6	108
CS15	92.9±11.1	114	FT14	91.4±6.9	148
CS21	96.3±7.4	102	FT15	95.0±5.3	137
SS03	93.8±5.2	116	CS02	90.0±7.6	142
SS04	92.9±7.6	145	SSJ05	93.8±7.4	200
SS07	88.8±9.4	180	SSJ09	97.5±4.6	124
D02	88.8±6.4	154	SSJ04	96.3±5.2	219
SED10	95.0±7.6	170	SED3	98.6±3.8	267
NSJ26	88.8±12.5	125	SED7	90.0±9.3	186
			SED8	91.3±13.6	164

Five sites showed an indication of sediment toxicity; one with reduced growth, and 4 with reduced survival (Table 2). There was nearly complete mortality at stations SED11 and SED12, and nearly 80% mortality at NSJ18. The Hospital Creek split sample from the coalition group (HCRR) showed 25% mortality.

Table 2. Sites with sublethal or lethal toxicity to H. azteca.

Site	Location	Survival (%)	Mean weight at end (as % of control)
Growth inhibition			
NSJ24	Dry Creek @J9	91.3±6.4	82
Mortality			
SED11	Unnamed drain on Bonetti Dr.	3.8±7.4	Not determinable*
NSJ18	Orestimba Crk @ Kilburn Rd.	21.3±11.3	56
SED12	Hospital Crk @ Rt. 33	2.5±4.6	Not determinable*
HCRR	Hospital Crk @ River Rd.	75.0±19.3	80

* weight at end of test was indeterminable because of poor survival.

The reason for the growth inhibition at NSJ24 is unknown since all pesticide analytes were undetectable in the sample except DDT, which was present in only trace amounts. There are, however, probable explanations for all instances of significant mortality.

Sediments at station SED 11 contained 44 ng/g esfenvalerate and 2 ng/g lambda-cyhalothrin. When these concentrations are organic carbon normalized and compared to the known pyrethroid LC50s for *H. azteca* (Amweg, et al., in press), the concentrations

equate to 1.1 TUs of esfenvalerate and 0.1 TUs of lambda-cyhalothrin. Thus, esfenvalerate was probably responsible for the mortality observed to H. azteca. A dilution series with SED11 sediments indicated that the material had to be diluted to 36% of original concentration (95% confidence interval = 32-41%) in order to obtain 50% survival. This dilution suggests the sample contained about 2.8 TUs of the toxicant. The same location was resampled approximately 7 weeks later in connection with another project, and it again contained acutely toxic levels of esfenvalerate (54 ng/g), had 17% survival, and an LC50 of 54% determined by dilution.

The probable cause for toxicity at NSJ18 was lambda-cyhalothrin. The sediments contain 6.1 ng/g lambda-cyhalothrin (average of 5.0 and 7.2 in two replicates), or approximately 2.0 TUs. In a dilution series, 50% survival was reached at 68.7% NSJ18 sediments (95% confidence interval = 64.1-73.7), indicating 1.5 TUs.

The probable cause for toxicity at SED12 was bifenthrin, with some contributions from other pyrethroids. The sample contained 20.6 TUs of bifenthrin, as well as 0.8 TUs of lambda-cyhalothrin and 0.2 TUs of esfenvalerate. When sampled again 7 weeks later, the sediment at this site contained 7 TUs of bifenthrin, 0.5 TUs of lambda-cyhalothrin, and 0.3 TUs of esfenvalerate.

HCRR, the Hospital Creek split sample provided by a coalition group, contained 4.4 ng/g of lambda-cyhalothrin, or about 1.4 TUs. This compound could explain the moderate toxicity seen in the sample.

Concentrations approaching or exceeding a TU are strong indication that the compound is a major contributor to the observed toxicity. For all four samples with acute mortality, there are sufficient concentrations of one or more pyrethroids to account for the toxicity. This relationship is even more convincing given that of the 29 sites that did not show significant mortality, only 1 contained enough TUs of pyrethroids to expect mortality (FT14; 1.5 TU bifenthrin). In other words, of the five samples with sufficient pyrethroid concentrations to expect mortality, mortality was observed in 4 of them.

QUALITY ASSURANCE: SEDIMENT TOXICITY

Control survival – Survival of H. azteca in control sediments averaged 94.5%, and ranged from 91.3-97.5%.

Reference toxicant – During the period of toxicity testing of these samples, monthly reference toxicant tests were run using cadmium chloride in water-only 96 hr exposures. LC50s for these tests averaged 10.5 mg/l and ranged from 9.0 to 12.1 mg/l. This compares to the lab's running mean of 11.4±1.9 mg/l.

Field duplicate – Two independent samples were collected at stations SED9 and SSJ12. Survival rates in the SED9 samples were 96.3%±5.2 and 95.0%±7.6. Survival rates in the SSJ12 samples were 95.7%±5.3 and 95.0%±7.6.

Laboratory duplicate – One sample, NSJ18, was tested three times. Survival rates were 21.3±11.3%, 0±0%, and 1.3±3.5%. Another sample, SED11, was tested twice with survival of 3.8±7.4% and 0±0%

Repeat sampling – The Ag. Waiver sediment sampling protocol does not call for resampling of sites, regardless of whether or not toxicity is observed. However, two sites found to be toxic during regular sampling were revisited approximately seven weeks later, and resampled for a related project. The toxicity testing results (given as percent survival) were as follows:

SED11 – First sample = 3.8±7.4%; Second sample = 16.7±15.3%

SED12 – First sample = 2.5±4.6%; Second sample = 0±0%

QUALITY ASSURANCE: SEDIMENT CHEMISTRY

Surrogate recovery – DBOFB on HP5 column: mean=103; range=56-255.
DBOFB on DB-605 column: mean=86; range=58-159.
DCBP on HP5 column: mean=91; range=68-115.
DCBP on DB-605 column: mean=97; range=74-121.

Blank – One blank sample was run, consisting of commercial sand, processed in the laboratory identically to all field collected samples. It contained no detectable pesticide residues.

Field duplicate – Two independent samples were collected at stations SED9 and SSJ12. Twenty-one of the analytes were not detected (< 1 ng/g) in either duplicate from either location. Of the remaining seven analytes that were detected in at least one of the duplicates, the results are as follows (concentrations in ng/g dry weight):

Analyte	SED9-1	SED9-2	SSJ12-1	SSJ12-2
chlorpyrifos	4.9	4.5	2.6	2.6
DDE	3.4	2.3	1.3	1.8
dieldrin	2.1	< 1	<1	<1
DDT	11.0	9.5	1.5	6.0
bifenthrin	2.2	1.1	<1	<1
methoxychlor	<1	1.1	<1	<1
permethrin	<1	2.3	<1	2.4

Laboratory duplicate – One sample, NSJ18, was split after homogenization and the two splits analyzed independently. Twenty-two of the analytes were not detected (< 1 ng/g) in either split. Of the remaining six analytes that were detected in at least one of the splits, the results are as follows (concentrations in ng/g dry weight):

Analyte	NSJ18-1	NSJ18-2
chlorpyrifos	1.4	2.3
DDE	43.2	36.5
dieldrin	1.6	2.2
DDD	3.1	1.8
DDT	10.8	12.6
lambda-cyhalothrin	7.2	5.0

Repeat sampling – The Ag. Waiver sediment sampling protocol does not call for resampling of sites. However, two sites found to be toxic during regular sampling were revisited approximately seven weeks later, and resampled for a related project. The results (ng/g dry weight) are as follows, listing only the analytes that were detectable in at least one of the samples:

Analyte	SED11 (first)	SED11 (second)	SED12 (first)	SED12 (second)
chlorpyrifos	3.9	4.8	13.4	<1
DDE	2.7	3.2	36.4	30.4
DDD	2.3	1.3	3.9	3.5
DDT	3.4	5.5	12.7	8.5
dieldrin	<1	<1	1.1	<1
bifenthrin	<1	3.2	41.2	8.4
lambda-cyhal.	1.9	<1	4.1	1.5
esfenvalerate	43.8	54.5	1.7	1.9
permethrin	<1	2.6	3.2	<1

Matrix spike – data not yet available
GC/MS confirmation – data not yet available

LITERATURE CITED

Amweg, E.L. and D.P. Weston. In press. Use and toxicity of pyrethroid pesticides in the Central Valley, CA, USA. Environ. Toxicol. Chem.

US EPA 2000. Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates. EPA/600/R-99/064. U.S. Environmental Protection Agency, Washington, D.C.

Weston, D.P., J. You, and M.J. Lydy. 2004. Distribution and toxicity of sediment-associated pesticides in agriculture-dominated water bodies of California's Central Valley. Environ. Sci. Technol. 38(10):2752-2759.